

DEVELOPMENTAL STAGES OF SCIENTIFIC INQUIRY SKILLS

	PRE-NOVICE	NOVICE	INTERMEDIATE	ADVANCED	MASTERY
Designing/ Performing Experiments	<ul style="list-style-type: none"> ➤ does not form questions when encountering new information ➤ uses “watch and see” approach; cannot plan beyond observation stage 	<ul style="list-style-type: none"> ➤ asks questions which may or may not be testable ➤ outlines general approach but no detail on controlling variables ➤ can identify some materials needed and describe procedures in broad terms 	<ul style="list-style-type: none"> ➤ asks testable questions ➤ can distinguish between testable and non-testable questions ➤ plans what to control and compare but does not carry through in practice ➤ can identify most material needed and describe procedures in greater detail, including what will be measured and how 	<ul style="list-style-type: none"> ➤ uses questions and knowledge to form several hypotheses; may form new questions based on findings ➤ defines variables, constants and control groups, and plans for repeated trials ➤ can identify all material needed and describe procedures in a step-by-step format so the experiment can be performed by others ➤ can identify potential sources of experimental error and refine experimental design 	<ul style="list-style-type: none"> ➤ uses questions and knowledge to form several hypotheses; may form new questions based on findings ➤ is able to state hypotheses in the negative ➤ defines variables, constants and control groups, and plans for repeated trials ➤ can identify all material needed and describe procedures in a step-by-step format so the experiment can be performed by others
Observing/ Recording	<ul style="list-style-type: none"> ➤ makes unrelated observations ➤ indecipherable or no records ➤ data is inaccurate 	<ul style="list-style-type: none"> ➤ notices a few traits using his/her own senses ➤ rarely uses descriptive language ➤ observations are insufficient to answer questions ➤ data is partially accurate 	<ul style="list-style-type: none"> ➤ makes both general and specific observations ➤ sometimes selects appropriate measuring tools and equipment ➤ sometimes uses descriptive language ➤ observations are sufficient to answer most questions ➤ data is accurate 	<ul style="list-style-type: none"> ➤ makes thorough observations sufficient to answer all questions ➤ usually selects appropriate measuring tools and equipment ➤ usually uses descriptive language ➤ data is accurate 	<ul style="list-style-type: none"> ➤ notices exceptional traits that are unusual or hard to observe ➤ always selects appropriate measuring tools and equipment ➤ always uses advanced descriptive language, such as analogy ➤ data is accurate
Organizing Data	<ul style="list-style-type: none"> ➤ collects no data or collects data or observations that are unrelated to the task 	<ul style="list-style-type: none"> ➤ collects insufficient data or observations to draw conclusions ➤ rarely includes labels, titles, and units of measure (where appropriate) ➤ rarely includes unexpected events or observations which relate to the problem at hand ➤ uses teacher-provided organizational format (charts, graphs, etc.) 	<ul style="list-style-type: none"> ➤ collects sufficient data or observations to draw conclusions ➤ sometimes includes labels, titles, and units of measure ➤ sometimes records unexpected events or observations which relate to the problem at hand ➤ chooses appropriate organizational format from choices provided by the teacher 	<ul style="list-style-type: none"> ➤ collects complete data or observations to draw conclusions ➤ usually includes labels, titles, and units of measure ➤ usually records unexpected events or observations which relate to the problem at hand ➤ self-selects appropriate organizational format to communicate results clearly 	<ul style="list-style-type: none"> ➤ collects complete data or observations to draw conclusions ➤ always includes labels, titles, and units of measure ➤ always records unexpected events or observations which relate to the problem at hand ➤ self-selects most appropriate organizational format to communicate results clearly ➤ may combine a variety of organizational formats that showcase data in a creative or unusual way
Inferring/ Interpreting	<ul style="list-style-type: none"> ➤ makes ineffective/unrelated inferences based on past experiences or observations ➤ gives no rationale or explanation ➤ never applies concepts learned to interpret observations ➤ unable to generate interpretations 	<ul style="list-style-type: none"> ➤ sometimes makes reasonable inferences based on past experiences or observations ➤ rarely gives rationale or explanation ➤ rarely applies concepts learned to interpret observations ➤ often confuses observation and interpretation ➤ able to generate one interpretation of an event or observation, but may be implausible 	<ul style="list-style-type: none"> ➤ usually makes reasonable inferences based on past experiences or observations ➤ gives incomplete rationale or explanation which may include misconceptions ➤ sometimes applies concepts learned to interpret observations ➤ can distinguish between observation and interpretation ➤ able to generate at least one plausible interpretation of an event or observation 	<ul style="list-style-type: none"> ➤ always makes reasonable inferences based on past experiences or observations ➤ gives complete rationale or explanation which supports the inference accurately ➤ usually applies concepts learned to interpret observations ➤ can distinguish between observation and interpretation ➤ able to generate more than one plausible interpretation of an event or observation 	<ul style="list-style-type: none"> ➤ always makes reasonable inferences based on past experiences, observations, and/or additional resources (i.e., research, class data, etc.) ➤ gives complete rationale or explanation which supports the inference accurately ➤ always applies concepts learned while interpreting observations ➤ can distinguish between observation and interpretation ➤ able to generate more than one plausible interpretation of an event or observation ➤ uses inferences to predict other possible observations