

# NLIST / Council of State Science Supervisors/ NASA Grant

## STUDENT SCORING RUBRIC

### GRADE-BAND VIEW FORMAT

#### PRIMARY (K-2)

#### ABILITIES NECESSARY TO DO SCIENTIFIC INQUIRY:

##### A. Asking Questions

- 4 Asks a question that relates to a topic of study without teacher guidance
- 3 Asks a question that relates to a topic of study with some teacher guidance
- 2 Asks questions but requires extensive teacher guidance
- 1 Asks questions unrelated to the topic of study

##### B. Conducting Investigations

- 4 Makes at least three observations directly related to the investigation using both qualitative (descriptions of observations using five senses) and quantitative observations (information gathered from counts of measurements)
- 3 Makes observations directly related to the investigation using either qualitative or quantitative observations
- 2 Makes observations with teacher support
- 1 Makes observations not directly related to the investigation

##### C. Using Tools to Extend the Senses

- 4 Selects and correctly uses appropriate tools independently
- 3 Selects and uses tools appropriately with minimal assistance
- 2 Selects appropriate tools with some assistance but may make mistakes in their use
- 1 Unable to correctly select and use tools

##### D. Develop Reasonable Explanations to Explain Observations

Not developmentally appropriate

##### E. Sharing Findings with Classmates, Teacher, Family, or Community Members

- 4 Describes and compares things in terms of characteristics (e.g., number, shape, texture, size, weight, color), relative order (e.g., before/middle/after, top/bottom), and motion (e.g., fast/slow, straight/curved); draws pictures that correctly portray most features of the thing being described
- 3 Describes and compares things in terms of characteristics, relative order, or motion; draws pictures that correctly portray some features of the thing being described
- 2 Describes things in terms of characteristics; draws pictures that illustrate some features of the thing being described
- 1 Describes things in terms of characteristics

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## GRADE-BAND VIEW FORMAT

INTERMEDIATE

3-5

### ABILITIES NECESSARY TO DO SCIENTIFIC INQUIRY:

#### A. Asking Testable Questions that May be Explored through Scientific Investigation

- 4 Asks testable questions that may be explored scientifically without teacher guidance
- 3 Asks testable questions with minimal teacher guidance
- 2 Asks testable questions with considerable teacher guidance
- 1 Uses teacher-generated question

#### B. Planning and Conducting an Investigation

- 4 Plans and conducts a replicable investigation that has logical steps; may make logical amendments to the investigation
- 3 Plans and conducts a replicable investigation with few logic errors; may make changes which are not logical to the investigation
- 2 Plans and conducts an investigation with considerable teacher guidance
- 1 Uses teacher-provided investigation

#### C. Using Simple Equipment and Tools to Gather Data and Extend the Senses

- 4 Consistently chooses appropriate tools/equipment and consistently uses them correctly and accurately
- 3 Usually chooses appropriate tools/equipment and usually uses them correctly and accurately
- 2 Sometimes chooses appropriate tools/equipment and sometimes uses them correctly and accurately
- 1 Seldom chooses appropriate tools/equipment and seldom uses them correctly and accurately

#### D. Using Data to Develop a Reasonable Explanation to Answer the Question Being Investigated

- 4 Consistently records and organizes data in a logical manner and develops a reasonable explanation based on collected data and/or facts from reliable scientific sources
- 3 Usually records and organizes data in a logical manner and develops a reasonable explanation based on collected data and/or facts from reliable scientific sources
- 2 Records of and organization of data is incomplete/inaccurate and explanation may be logical but reflects incomplete/inaccurate data or scientific information
- 1 Records of and organization of data is missing and explanation, if present, is illogical

#### E. Communicating Procedures, Results, and Explanations of an Investigation

- 4 Writes precise instructions that others can follow in carrying out procedures; makes detailed sketches to aid in explaining procedures or ideas; uses qualitative and quantitative data to describe and compare objects and events
- 3 Writes instructions that others can follow in carrying out procedures; makes sketches to aid in explaining procedures or ideas; uses qualitative data to describe and compare objects and events
- 2 Writes incomplete instructions; draws inaccurate sketches; ignores data when describing objects and events
- 1 Writes inaccurate instructions; does not use sketches; communicates incomplete and inaccurate descriptions of objects and events

# NLIST / Council of State Science Supervisors/ NASA Grant

## STUDENT SCORING RUBRIC

### GRADE-BAND VIEW FORMAT

#### MIDDLE

#### 6-8

#### ABILITIES NECESSARY TO DO SCIENTIFIC INQUIRY:

##### A. Identifying Questions and Formulating Hypotheses that May be Examined through Scientific Investigations

- 4 Formulates testable questions and hypotheses that are specific, based on scientific concepts, and lead to scientific investigation
- 3 Formulates testable questions and hypotheses that lead to scientific investigation
- 2 Formulates testable questions which lead to a scientific investigation; even though the hypotheses is present it does not directly answer the question
- 1 Testing the question is not possible; hypothesis is missing or unclear

##### B. Designing and Conducting a Scientific Investigation

- 4 Identifies what variable is controlled and what variables are manipulated; design of investigation is sequential and logical to the hypothesis; experimental design requires minimal teacher guidance
- 3 Identifies what variable is controlled and what variables are manipulated; design of investigation is sequential and logical; experimental design requires minimal teacher intervention
- 2 Flaws are evident in identifying variables; design of investigation contains minor flaws; some teacher intervention is necessary
- 1 Little attempt is made to control and manipulate variables; design of investigation contains major flaws in sequence and logic; extensive teacher intervention is necessary

##### C. Using Appropriate Tools and Techniques to Collect and Record Data

- 4 Collects and records data which is complete, accurate, and objective; uses appropriate equipment and techniques; requires minimal teacher guidance
- 3 Collects and records complete and objective data; uses appropriate equipment and techniques; requires minimal teacher intervention
- 2 Collects and records objective data; incorrectly uses equipment and techniques; requires some teacher intervention
- 1 Collects and records invalid data; uses inappropriate equipment and techniques; data collected contains inaccuracies in measurement which alter the results; required extensive teacher intervention or guidance

##### D. Using Evidence to Develop Explanations and Describe Relationships between Evidence and Explanation

- 4 Data is analyzed objectively; students draw logical inferences based on observed patterns and relationships; inferences lead to questions for future investigations
- 3 Students draw inferences based on relationships, perceived patterns, or previously held ideas
- 2 Students draw faulty inferences based on patterns or previously held ideas
- 1 Students are unable to draw inferences (interpretation of an observation)

# NLIST / Council of State Science Supervisors/ NASA Grant

## E. Communicating Procedures, Results, and Explanations of a Scientific Investigation

- 4 Scientific information is communicated clearly and precisely but may also include inventive/expressive dimensions; presentation is effectively focused and organized (e.g., using tables, models, texts, figures); a variety of media enhance communication
- 3 Scientific information is communicated clearly; presentation is focused and organized; medium facilitates communication
- 2 Scientific information has some clarity; presentation has some focus and organization; medium permits communication
- 1 Scientific information is unclear; presentation lacks focus and organization; medium hinders communication

# NLIST / Council of State Science Supervisors/ NASA Grant

## STUDENT SCORING RUBRIC

### GRADE-BAND VIEW FORMAT

HIGH  
9-12

#### ABILITIES NECESSARY TO DO SCIENTIFIC INQUIRY:

##### A. Formulating Questions and a Hypothesis Statement

- 4 Formulates a coherent testable hypothesis that potentially answers the question; completely supported by prior knowledge
- 3 Formulates a coherent testable hypothesis that potentially answers the question; partially supported by prior knowledge
- 2 Formulates a hypothesis that may not answer the question; supported by opinions and misconceptions
- 1 Is not able to formulate a testable hypothesis that answers the question

##### B. Designing and Conducting Scientific Investigations

- 4 Designs and conducts a scientific investigation related directly to the hypothesis; steps are logical and sequential; variables and constants are identified and managed objectively; repeated trials are sufficient to validate results
- 3 Designs and conducts a scientific investigation related directly to the hypothesis; steps contain minor inaccuracies in logic and/or sequence; minor inaccuracies in identifying and managing variables and constants do not significantly affect overall results; evidence of repeated trials
- 2 Relationship between the hypothesis and the scientific investigation lacks clarity; steps are missing and/or difficult to follow; variables and constants are not properly identified and/or mismanaged and detract from results; trials are insufficient to test hypothesis
- 1 Designs and conducts a scientific investigation unrelated to the hypothesis; steps are not logical, not sequential, and/or are vague; variables and constants are missing; no repeated trials

##### C. Using Appropriate Tools and Techniques to Collect and Record Data

- 4 Selects and safely uses lab equipment; effectively chooses/uses appropriate technology and mathematical concepts; data is collected and recorded in a systematic, accurate, and objective manner
- 3 Selects and safely uses lab equipment; generally chooses/uses appropriate technology and mathematical concepts; minor inaccuracies and some subjectivity in data collection; some inconsistencies present in recording data
- 2 Incorrectly uses equipment and techniques; some unsafe practices are evident; ineffective use of technology and mathematical concepts; errors present in collected data
- 1 Selects inappropriate equipment and techniques; does not employ safety when using lab equipment, ineffective use of technology and mathematical concepts; significant errors or gaps in collected data

# NLIST / Council of State Science Supervisors/ NASA Grant

## D. Formulating and Revising Scientific Explanations and Models Using Logic and Evidence

- 4 Explanations/models reflect evidence from investigation and are based on accurate science; uses results to verify or refute the hypothesis; formulates possible revisions and alternative explanations
- 3 Explanations/models partially reflect evidence from investigation and are based on accurate science; uses results to verify or refute the hypothesis; formulates possible revisions
- 2 Explanations/models are based on flawed analysis of data and misconceptions of science; formulates limited revisions
- 1 Explanations/models are not based on analysis of data or accurate science; data which refutes the hypothesis is discounted; connections are not present between results and hypothesis; no evidence of possible revision and alternative explanations

## E. Communicating and Defending a Scientific Argument

- 4 Methods and procedures are clearly and accurately represented to allow replication of the investigation and enhance opportunities for further investigation; arguments and responses to critical comments are logical and effectively demonstrate understanding of relationships between the investigation and accurate science
- 3 Methods and procedures are generally accurate to allow replication of the investigation and support the opportunity for further investigation; arguments and responses to critical comments contain some flaws in logic but generally demonstrate the connections between the investigation and accurate science
- 2 Methods and procedures are unclear or represented inaccurately; arguments and responses to critical comments as well as the connections between the investigation and accurate scientific knowledge are flawed
- 1 Methods and procedures are unclear and inaccurately represented; arguments and responses to critical comments as well as the connections between the investigation and accurate scientific knowledge are missing