

## APPLY SCIENTIFIC INQUIRY AND SCIENTIFIC HABITS OF MIND

### Performance Standard 11A/13A/13 B.F

Students will apply the concepts, principles and processes of scientific inquiry within classroom investigations accordingly:

- *Knowledge*: Understand the concepts, principles and processes of scientific inquiry.
- *Application*: Apply the appropriate scientific habits of mind when investigating science concepts.
- *Communication*: Incorporate scientific technologies and the processes of scientific inquiry into classroom investigations and reports.

**Note to teacher: These concepts could be embedded into scientific inquiry investigations. Suggested activities for standards 12 A, B, C, E and F at stage F, incorporate many of the performance descriptions for Standard 11A.**

### Procedures

1. ***In order to know and apply the concepts, principles and processes of scientific inquiry (11A) and the accepted practices of science (13A) and apply scientific technologies (13B)***, students should experience sufficient learning experiences to develop the following:
  - Construct inquiry cause-effect hypothesis associated with the classroom curricular concepts.
  - Deliberate and explain the choice of applicable variables to test hypothesis.
  - Determine choice of experimental, observational or remote investigation processes.
  - Research pertinent sources of scientific information related to historic and current foundations for similar studies.
  - Design and conduct inquiry investigation which finds answers to posed hypotheses/questions.
  - Use scientific technologies to collect, store, retrieve and communicate data, as applicable.
  - Incorporate appropriate safety precautions and procedures to minimize safety hazards.
  - Follow classroom rules for preparation, procedures and clean-up.
  - Recognize the necessity of controlled variables, carefully recorded observations and replicable multiple trials.
  - Prepare data tables, charts and visualization.
  - Document observational and graphic data (using appropriate labels and units) accurately with appropriate precision.
  - Identify faulty procedural steps which could cause different results and record observations accurately and honestly.
  - Analyze comparable data from classroom grouping and multiple trials.
  - Differentiate observations that support or refute a hypothesis.
  - Synthesize data and interpret trends to produce reasonable explanations.
  - Evaluate and explain unexpected data, sources of error, or discrepancies in the data set.
  - Explain why similar investigations should but may not produce similar results or conclusions.
  - Communicate the investigation's hypothesis, procedure and explanations orally and in written format for peer review.
  - Generate further questions which address procedures, similarities, discrepancies or conclusions for further investigations.
2. Separated assessment of 11A may not be practical. Significant research has demonstrated the value of inquiry-based, life-long learning for students. The emphasis of scientific inquiry is incorporated into the wording of all performance descriptions for Goal 12, in stages A-J. A spiraling, inquiry-based curriculum is encouraged for all classrooms. Specific performance descriptions may be emphasized in different inquiry investigations in order to build mastery of each concept or process of scientific inquiry.
3. See suggested procedures for 12A, 12B, 12 C, 12E and 12F at stage E for specific assessment features.

### **Examples of Student Work not available**

- **Time Requirements**
- Initial introduction of processes may require additional time as needed by students.