

## APPLY TECHNOLOGICAL DESIGN AND SCIENTIFIC HABITS OF MIND

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

Students will apply the concepts, principles and processes of technological design within classroom investigations accordingly:

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

**Note to teacher: These concepts should be embedded into technological design investigations in varying combinations. Suggested activities and assessments for standards 12C and F at stage A, incorporate many of the performance descriptions for Standard 11B.**

### Procedures

1. ***In order to know and apply the concepts, principles and processes of technological design (11A) and the accepted practices of science (13A) and apply scientific technologies (13B)***, students should experience sufficient learning experiences to develop the following:
  - Ask questions about a science concept that can be modeled or tested in a technological design investigation.
  - Identify criteria for measuring the success of proposed model or test of concept.
  - Prioritize possible model or test solutions from a given list for investigation possibilities.
  - Select a solution which addresses the design question.
  - Choose materials from teacher-generated options.
  - Determine the order of assembly steps.
  - Identify the variables for testing.
  - Propose procedural steps to test design.
  - Sketch the projected final design.
  - Use established classroom safety, order and cleanliness rules during science design investigation.
  - Construct the selected solution using the materials and tools provided.
  - Apply the use of appropriate scientific tools, such as instruments for measuring length, or temperature.
  - Record observational data for the design process.
  - Record scientific data accurately and honestly.
  - Test the design in multiple trials (across timed intervals, if applicable) according to teacher-generated criteria.
  - Collect data from test using appropriate measurement methods.
  - Communicate results of design tests.
  - Compare data from student trials to evaluate design success.
  - Propose reasons for differences in observations.
  - Report the procedures followed.
  - Evaluate the best design to solve the question.
  - Propose modifications for the design solution in additional trials.
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2. Separated assessment of 11B may not be practical. Significant research has demonstrated the value of inquiry-based hands-on life-long learning for students. The emphasis of technological design 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 technological design investigations in order to build mastery of each concept or process of technological design.
3. See suggested procedures for 12C and F at stage A for specific assessment features.

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

### **Time Requirements**

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

### **Resources**

- Science Rubric