

DISCOVERING SCIENCE 8 TEACHER'S RESOURCE

ASSESSMENT

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Introduction

Assessment and evaluation are integral components of recent curriculum documents, requiring a somewhat different approach from those taken in the past. This assessment section is intended to help you with the monitoring of student progress with regard to outcomes in order to better inform teaching and learning.

How to Use This Section

This section is a resource to which you can refer when you need sample assessment strategies, photocopy-ready assessment masters, ideas on how to record assessment data, or an explanation of how the instructional activities in *Discovering Science 8* match outcomes. Once you have become familiar with the contents of this section, you can refer to certain sections as required.

Purpose

This section:

- discusses the differences between assessment and evaluation, and the purposes of each, as well as defining other relevant terminology
- provides assessment masters to help you assess student learning
- provides helpful hints on how to get started with and manage suggested achievement indicators
- makes suggestions for recording assessment data and for putting the data together to provide information for reporting purposes

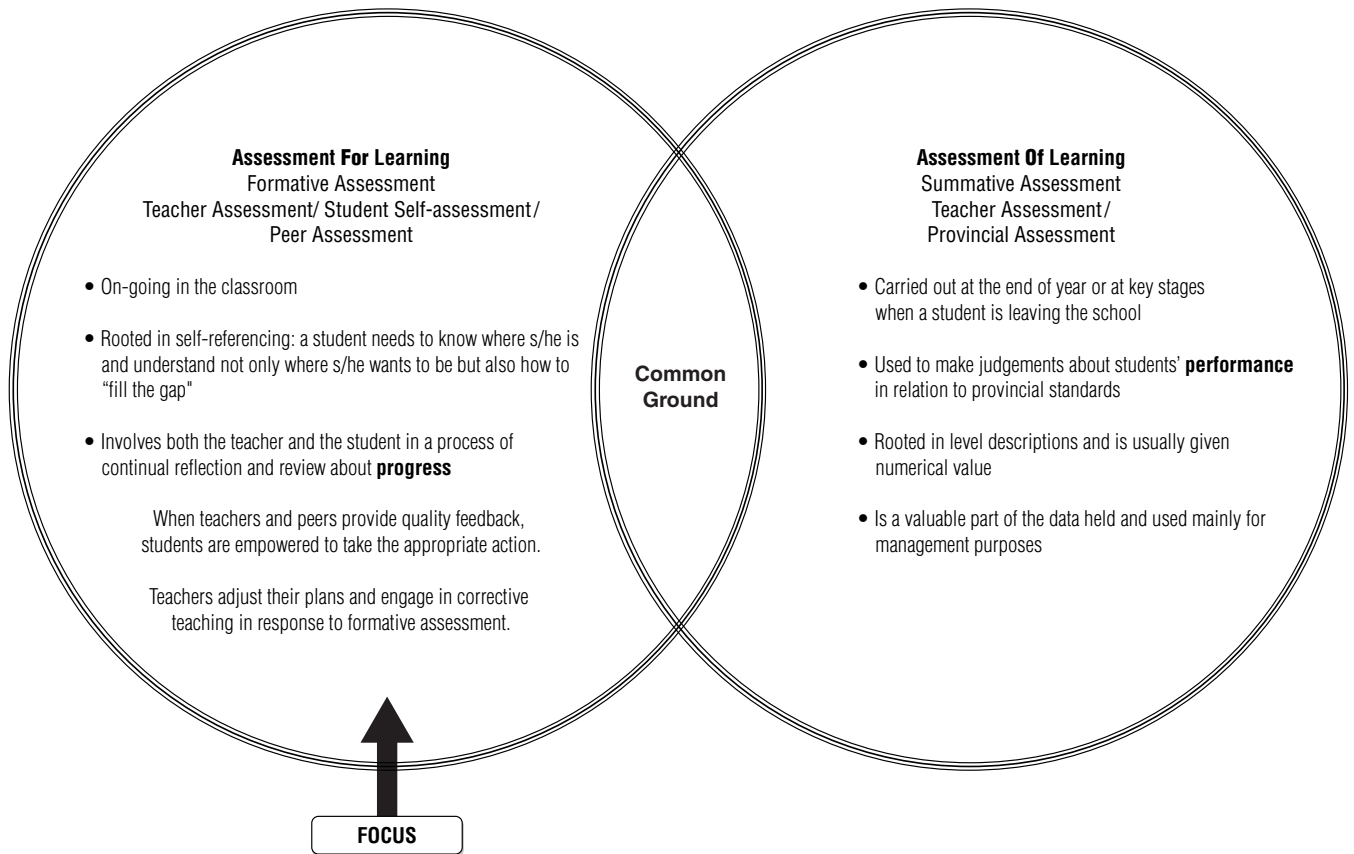
How Are Assessment and Evaluation Related?

What relationship links the processes of assessment, evaluation, and grading? What are the implications of this relationship for your teaching?

The following definitions of assessment, evaluation, and marking will ensure that you have a basis from which to work in this document.

- **Assessment:** Collecting data with respect to classroom assessment and measuring student achievement in a wide variety of formats; a way of finding out what students know and what they can do.
- **Evaluation:** Interpreting the assessment data and assigning a value. This is one of the most important judgement-making aspects of teaching.
- **Marking, Grading, and Reporting:** Communicating evaluation results. This is an ongoing, daily process, aimed at improving student achievement and success with the learning outcomes. Effective evaluation combines various assessment instruments, including anecdotal comments based on observation and interviews. This *Discovering Science 8* assessment section suggests where such instruments can be appropriately used to assess students' understanding of text material and of the processes of science.

Formative and Summative Assessment



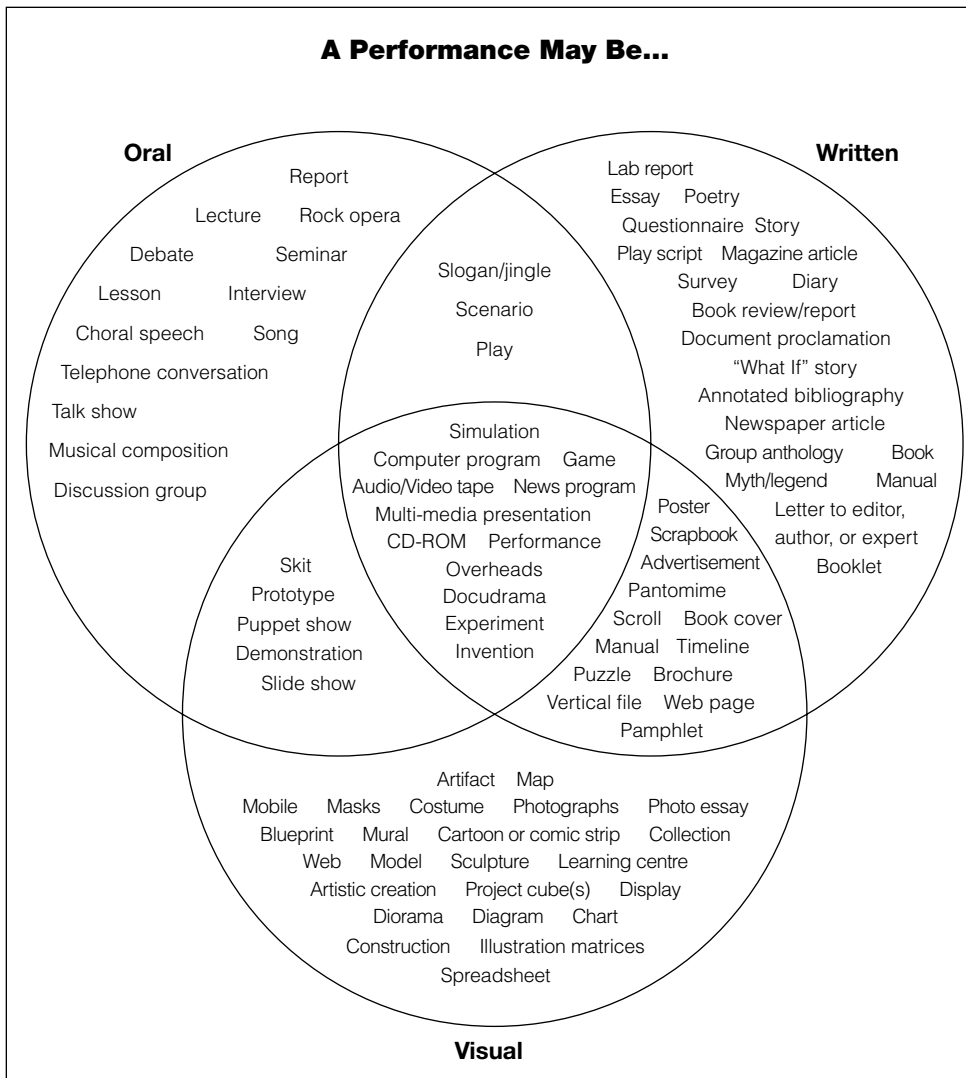
⇒ Over the past several months, when have you used formative assessment? What form did it take? What was its purpose? In what other ways could you use formative assessment?

Authentic Assessment

Current emphasis in assessment is on authentic assessment and holistic assessment. Authentic learning emphasizes learning that is relevant to students and their experiences in the world outside the classroom; it is concerned more with process than with product, and students are assessed in the same manner they were taught.

Performance Tasks

What exactly is a performance task? The current emphasis on authentic assessment might suggest a realistic problem-solving situation. But performance tasks can and do encompass a very broad variety of activities, as illustrated in the figure below. Like formative and summative assessment, whether a task is or is not a performance task often depends on the context and the intent of the task.



Source: K. O'Connor, *The Mindful School: How to Grade for Learning* (Skylight Publications, 1999).

⇒ Examine the figure above. How many of the tasks shown in the figure have you used over the past few months? Select several that you have never used and think about how you might use them. Note especially tasks that are suitable for ESL and other students for whom reading might be difficult.

How can you develop or improve the performance tasks you use in your classroom? You need first to know exactly what characterizes a performance task and then follow some clear steps, as discussed on the following pages, to develop one.

Defining a Performance Task

A performance task should:

- be aligned with outcomes
- provide students with opportunities to communicate their thinking and understanding of a science experience and not just provide a single answer
- provide an opportunity for an evaluation of the processes involved in the task
- be realistic, interesting, and thought-provoking
- be representative of the outcome being evaluated so generalizations can be made about a student's achievement
- stress depth more than breadth and mastery more than speed
- be more open-ended than tightly structured
- be divergent (that is, not have one clear path of action specified at the beginning of the task)
- raise other questions or lead to other problems

The following steps will help you develop an effective performance task.

1. Be clear about the skills, knowledge, and level of ability students will be expected to demonstrate.
2. Ensure that you know the traits and key concepts of a strong performance (e.g., what moves a piece of writing from *fully meets expectations* to *exceeds expectations*?).
3. Create and describe a context for the task that will make it more meaningful and engaging.
4. Write a short description of the task.
5. Rewrite the task in a clear, concise manner.
6. Assign the task to the students.
7. Develop a step-by-step work plan.
8. Provide work samples to show students what *fully meets expectations* looks like.
9. Provide instruction.
10. Score the task and then make the necessary revisions for its use another time.

What Should Performance Assessment Do?

Current practice is shifting the focus of assessment from the exclusive use of written tests to a more balanced and realistic assessment of performance, an assessment that will help teachers deal effectively with the new curriculum expectations. In thinking about performance tasks, keep in mind the following ideas.

Performance assessments in science should:

- be introduced by using some simple but useful tasks
- focus on specific learning outcomes
- be used at all grade levels
- involve natural extensions of sound methodology for teaching science
- not be complex or difficult to implement
- be an integral part of the assessment process
- engage teachers in discussing the specific learning outcomes and how to achieve them
- lead to the development of sets of various assessment tasks that are aligned with outcomes
- develop ongoing criteria to evaluate performance tasks
- allow students a realistic way to show their in-depth understanding of a subject

Authentic assessment requires the use of performance tasks, but it is not always possible to use them—they aren't always appropriate. For example, would you use a performance task rather than a pencil and paper test to assess a student's ability to multiply numbers or recall specific events? Performance tasks are inappropriate for such assessment. It is important to add performance tasks to your existing array of tests rather than try to force performance tasks to assess situations in which they do not work.

Assessment Methods

The assessment methods in the following table are found throughout the *Discovering Science 8* student textbook and this *Teacher's Resource*. They are used to assess a variety of specific expectations according to the categories of the achievement chart and/or learning skills.

| Assessment Method | Description of Use | Categories of Process Skills Addressed | Example(s) from <i>Discovering Science 8</i> |
|---------------------------|--|--|--|
| Science notebooks | <ul style="list-style-type: none"> Used for reflection, expressing preferences or opinions, assessing attitudes, and assessing strengths and weaknesses | <ul style="list-style-type: none"> Communicating Applying specific knowledge Scientific problem solving Predicting | <ul style="list-style-type: none"> Reading Check questions and Pause and Reflect questions in section and chapter reviews |
| Portfolios | <ul style="list-style-type: none"> Include student work and their reflections on it Often used for a specific focus (e.g., problem solving, review) | <ul style="list-style-type: none"> Communicating Learning skills | <ul style="list-style-type: none"> Developed in <i>Teacher's Resource</i> |
| Observation | <ul style="list-style-type: none"> Used during text-reading strategies, problem-solving activities, student presentations, and to monitor progress in the use of technology | <ul style="list-style-type: none"> Problem solving Learning skills Observing Classifying | <ul style="list-style-type: none"> See <i>Teacher's Resource</i> for suggestions. |
| Pencil and paper tests | <ul style="list-style-type: none"> Focus on knowledge but could include some thinking skills | <ul style="list-style-type: none"> Knowledge | <ul style="list-style-type: none"> Section Reviews and Chapter Reviews |
| Projects | <ul style="list-style-type: none"> Apply knowledge to a real situation Used for solving a "big" problem in a realistic context | <ul style="list-style-type: none"> Designing experiments Measuring and reporting Problem solving Modelling | <ul style="list-style-type: none"> End-of-unit projects Design Your Own Investigation |
| Interviews/Conferences | <ul style="list-style-type: none"> Monitor progress Used during large projects, portfolio work, other work in progress | <ul style="list-style-type: none"> Communicating Knowledge Learning skills | <ul style="list-style-type: none"> See <i>Teacher's Resource</i> for suggestions. |
| Activities/Investigations | <ul style="list-style-type: none"> Allow students to state and test hypotheses, carry out procedures, analyze data and outcomes, and state conclusions Extensions allow students to design and report on their own investigations. Many activities and investigations involve group work. | <ul style="list-style-type: none"> Inquiry Problem solving Classifying Modelling Hypothesizing Communicating Designing experiments Controlling variables Fair testing | <ul style="list-style-type: none"> Throughout student textbook and <i>Teacher's Resource</i> |

Assessment Tools

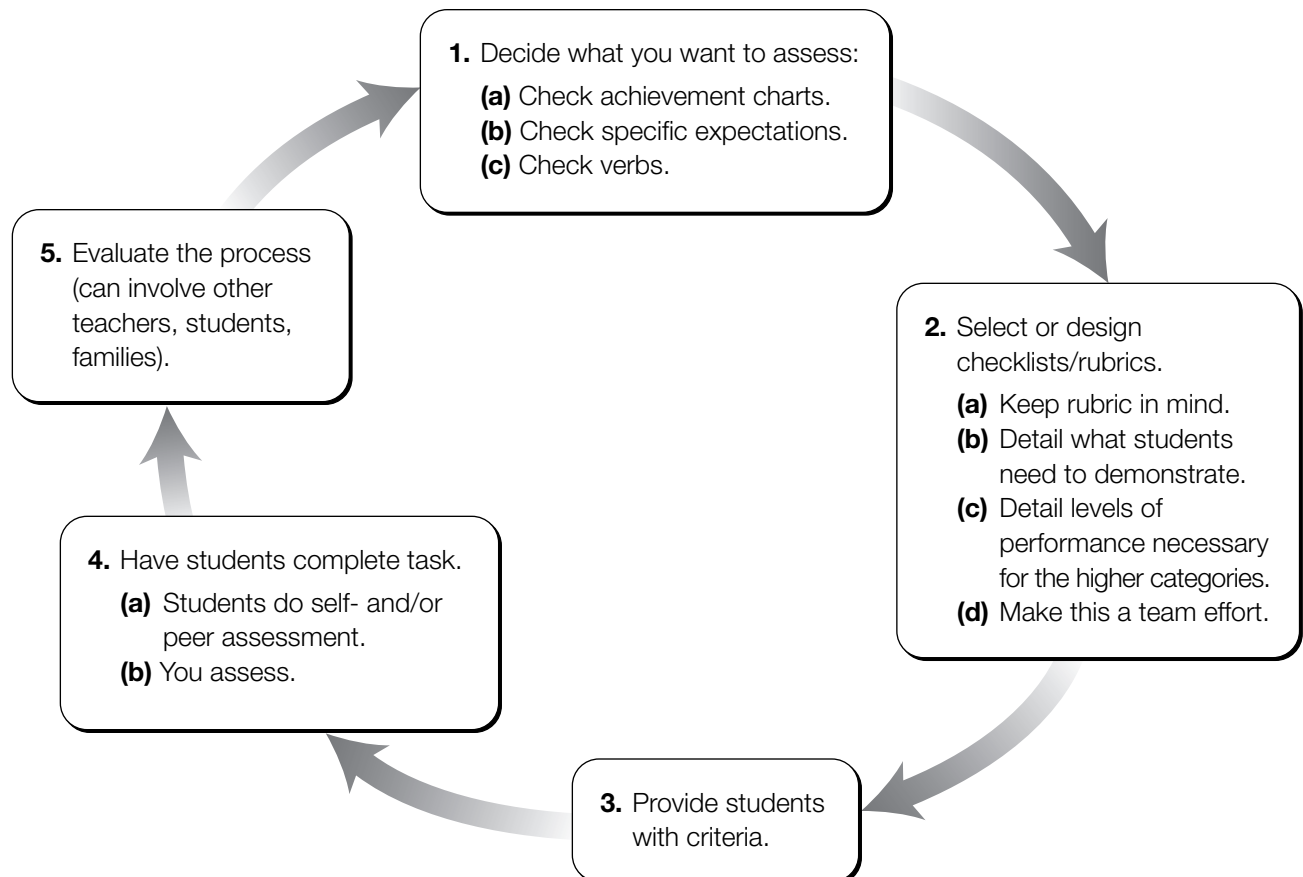
Just as there are many activities that help you to evaluate your students' knowledge, there are also a number of assessment tools. Assessment tools might include rubrics, checklists, observation notes, peer and self-assessment, and open-ended questions. This section includes Assessment Checklists and Rubrics that may be photocopied and used by you or your students as is or modified from the accompanying CD.

The Assessment Checklists provide a means for you to begin your assessment process. By working with these, with exemplars, with input from colleagues, from students, and with the assessment section of the science curriculum, you will be able to develop the detailed criteria that will give your students the information they need about the quality of classroom achievement they must be able to demonstrate.

No matter how you go about assessing your students, they need to know at the outset what is expected of them. They need to know what aspects of their work will be judged and what will constitute good or poor work. In this respect, a variety of exemplars will be essential. Students also need to know what will not be assessed (e.g., if they are conducting an inquiry activity, you are interested in the process, the procedure, and support for their findings; you are not looking for a "right" answer).

In the context of current assessment practices, how do you decide what you want to assess? Examine the assessment flowchart below.

Assessment Flowchart



An Assessment Checklist can be an effective means of involving students in their own assessment. Select or design an assessment checklist that details the specific skills or knowledge you feel a student needs to demonstrate in order for you to make an assessment of his or her ability. Then have students complete the self-assessment section.

The problem-solving checklist illustrated here shows how a task can be broken down into manageable (and assessable) categories for teacher and student.

Problem-Solving Checklist

Name: _____

Date: _____

Activity/Unit: _____

Assessment

The student:

Self

Teacher's

Demonstrates understanding of the problem

Thinks of a plan

Carries out the plan

Revises the plan when appropriate

Uses a variety of strategies

Combines strategies where appropriate

Synthesizes and summarizes results

Comments

To make the transition from your informal assessment checklists to the more formal rubrics as easy as possible, develop your rubrics with the checklists in mind, and tailor the rubrics to your own and your school's needs. There is nothing absolute about assessment; it is an evolving process in which you, your students, and your school ought to participate. Make use of the Assessment Rubric blackline masters and Assessment Checklists (modifying them as you see fit; they are available in a modifiable digital format on the accompanying CD) or develop your own. Whatever you decide to do, share your ideas with colleagues from your own school and others. The more you can work with and refine the rubrics, the more precise and useful they become. Once you get into the habit of working with rubrics, you will quickly see their advantages. Rubrics are not abstract numbering systems; they are classification systems that provide specific assessment guidelines for teachers and students alike. They help to clarify for everyone what is being assessed and why one sample of work is better than another. They also help students to assess their own work. If you and a student disagree on the evaluation, the rubric provides a framework that each of you can use in discussing a fair grade. You can also use the rubrics as back-up when discussing your student evaluations during parent/teacher meetings.

Benefits of Using Rubrics for Evaluation

There are two issues to think about here. First, instead of your evaluation of student work being based on a comparison with the work of other students, it will be based on the expectations and performance standards presented in the curriculum. In other words, your evaluation will be criterion-referenced. With the help of your colleagues and your students, you will come up with exemplars against which the work of students can be measured, and against which they can measure their own work. By using the rubric, it should be clear to you and to your students how a piece of work was evaluated.

The second issue is the subjectivity of your rubrics. How can you modify your rubrics so that they can be used by anyone and be fair to your students? Developing appropriate and useful rubrics takes time and experience. This is where teamwork comes in. As you work with existing rubrics, or begin developing them, you and your colleagues use, react to, and modify them until you have rubrics that work for all of you, including your students, who will understand why they received the marks they did.

Tips for Developing Great Rubrics

- Use clear terms to clarify examples—avoid use of *nice*, *good*, *many*, *more*, and *appropriate* without actual examples to clarify.
- State criteria in positive terms (e.g., *Used eye contact 50% of the time*).
- Use criteria that are observable—avoid use of terms such as *appreciate*, *value*, *believe*, and *enjoy*.
- Use checklists for criteria that are expected, “the givens”; examples of this are the length of the project, the number of words, and spelling errors.
- When at all possible, show students examples of what is expected.

Recording Student Work

As mentioned previously, you will need to collect a wide variety of exemplars so that you and your students are very clear about what is expected. You might want to have students keep a folder of their ongoing work, such as essays or projects that have been handed in and then returned to them. They will also have their science notebooks, from which you should be able to select exemplars for writing out investigations, scientific drawings, graphs, etc. If you encourage your students to keep a science notebook or a science journal, you will have another excellent source for examples of their work.

Probably the best source of exemplars is the portfolio. Like an artist's portfolio, a student's portfolio should contain samples of work that represent the best that the student can do at different stages, showing how the student has developed the work from the idea stage. The portfolio shows the overall picture of the development that is taking place in the science notebook or journal. Whereas in the science notebook or journal, the student describes and reflects on day-to-day challenges, triumphs, failures, and struggles, the science portfolio encapsulates the results. Encourage students to use material from their science notebooks and their ongoing work folders to add to their portfolio. The work should always be the best they feel they can do at a particular time. Set a time every few weeks when students have an opportunity to go through their portfolios, discarding some work and adding other samples that they feel show major improvement or that they feel they did particularly well. During the periods of time that students are re-assessing their portfolios, take some time to discuss the portfolio with individual students, encouraging them to express their reasons for including or discarding a piece of work.

Record Keeping and Reporting

Recording Tools

As you begin to use alternative forms of assessment, your record-keeping methods will need to be adapted accordingly. You will need more than a mark book. You might want to consider:

- a card file, with one (or perhaps several) card(s) for each student
- a binder page for each student, with the page divided into different categories
- a folder for each student, containing marks, anecdotal comments, checklists, etc.
- a database

Samples of recording tools you might use are shown on the next two pages.

Reporting

As noted earlier, the most consistent level of achievement should be reported. The standard software program to calculate average marks will probably not be adequate. Use software that addresses the most consistent level of achievement.

Assessment data consist of formative and summative data, numeric and anecdotal data, and percentages and levels. You need to develop consistent plans for combining these in a percentage mark.

Assessment Checklists and Rubrics

The assessment checklists and performance indicator rubrics in this section may be used in whatever ways work best for you and your students. Most of the checklists contain two assessment columns, one for the student and one for the teacher. You may choose to assign a point system for some or all of the checklists, or you may simply choose to assess on the basis of the 4-point scale (4–1) used in the rubrics. As you discuss and assess tasks the students complete, you can develop the specific and detailed criteria for each item that you and your students will be able to use to defend your evaluation of the task.

Name: _____

Date: _____

Strand: *Optics* _____

- Notebook:**
1. Neatness/organization:
 2. Lab write-up: All, most, some, few components:
 3. Completeness:

Comments: _____

Quizzes & Tests:

- | | | | | |
|----|----|----|----|-----|
| 1. | 2. | 3. | 4. | 5. |
| 6. | 7. | 8. | 9. | 10. |

Comments: _____

Lab Observations:

- | | |
|--------------------------------|-----------------------|
| 1. Knowledge of equipment: | 3. Write-up: |
| 2. Understanding of procedure: | 4. Safety procedures: |

Comments: _____

Unit Test: Score: _____ Performance indicator: _____

Comments: _____

Performance Task: _____

- | | |
|--|-------|
| 1. Understanding of Basic Concepts: | _____ |
| 2. Inquiry and Design: | _____ |
| 3. Communicating Required Knowledge: | _____ |
| 4. Relating Science to Technology and Societal Issues: | _____ |

Comments: _____

ASSESSMENT CHECKLIST 1

Making Observations and Inferences

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. Observations are made safely. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Observations use all appropriate senses. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Observations are quantitatively accurate and use metric measurements appropriately. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Observations are qualitatively accurate. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. When necessary, scientific drawings are made. (See Assessment Checklist 7, Scientific Drawing.) | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Appropriate tools and materials are used to make observations. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Personal opinions, conclusions, or inferences are avoided while making observations. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Data are recorded and organized appropriately and neatly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Inferences are reasonable given the observations made and the observer's prior knowledge. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Inferences are explained and justified based on the observer's prior knowledge. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 2

Asking Questions

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. Questions are thoughtful and relevant. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Questions are well crafted. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Questions emerge logically from observations. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Questions are descriptive of observations. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Questions interpret observations. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Questions analyze observations. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Questions lead to observations. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Questions lead to reasonable predictions. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. A question is selected for investigation. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. A thoughtful justification is given for why a question has been selected for further study. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 3

Designing an Experiment

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. The statement of the problem explains the need for the experiment. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The experimental design tests an hypothesis and/or a prediction. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The hypothesis is a simple statement that reflects the observations. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. A prediction can result from the hypothesis. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. A thoughtful justification is made for why the hypothesis and prediction can serve as the basis for an experiment. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The methods and procedures used in the experiment follow a logical sequence. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The experimental procedure is complete and clear enough that another person could carry it out. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. The manipulated variable is clearly identified. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. The plan allows for the manipulated variable to be controlled and measured accurately. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. The responding variable is clearly identified. | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. The plan allows for the responding variable to be measured accurately. | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. The experimental design uses the metric system. | <input type="checkbox"/> | <input type="checkbox"/> |

(continued)

ASSESSMENT CHECKLIST 3**Designing an Experiment** (continued)

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| 13. The experiment includes proper controls. | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Margin of error is noted, and a thoughtful discussion of reducing errors is made. | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. A complete list of required materials is provided. | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. A strategy to use repeated trials and measurements is described. | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Experimental design includes safety concerns and precautions. | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. The lab notes are neat, presentable, and well organized. | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. If needed, a neat, fully labelled diagram is included. | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Analysis includes all the data. | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Data are organized in a way that makes them easy to read or access (i.e., in charts, graphs, etc.). | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Key terms and complete sentences are used. | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Instructions are provided for proper clean-up and disposal of wastes. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 4

Laboratory Report

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| <i>Introduction</i> | | |
| 1. The title states clearly the manipulated variable and the responding variable. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Name(s) of experimenter(s) is/are given. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. A concise summary of the project includes the statement of the problem, the hypothesis, the procedures, the main results, and the conclusions. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Statement of the Problem</i> | | |
| 4. The background for the problem is summarized. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The hypothesis is stated clearly. It predicts the influence of the manipulated variable on the responding variable. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Experimental Design</i> | | |
| 6. The procedure for controlling and measuring variables through repeated trials is easy to follow. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Data Collection and Display</i> | | |
| 7. Refer to Assessment Checklist 18, Data Table, and Assessment Checklist 19, Graph from Data. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Data Analysis</i> | | |
| 8. Data analysis includes all of the data and is accurate and thoughtful. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Conclusion</i> | | |
| 9. The hypothesis is evaluated clearly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Extrapolations from the data are made and justified. | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. The student understands the science behind the study. | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Language is used correctly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. If used, bibliographical references are made properly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. The report is neat and presentable. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 5**Investigating an Issue**

| Element | Assessment | |
|--|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. Alternative positions are stated clearly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Criteria for choosing a position are stated. Criteria may be assigned values. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The audience was considered when making the list of criteria. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Each position was researched. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Support for each position is thoughtfully stated, with a clear explanation of the science that informs the issue. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Information sources were evaluated as to their degree of objectivity and accuracy. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Information from research is properly referenced. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Reasons for not supporting each position are stated thoughtfully. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. If two or more people are involved in the issue, each person in the group understands all reasons for and against each position. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. If two or more people are involved in making the decision, an appropriate form of discussion, negotiation, and compromise is used. | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. The alternative positions are scored on each of the criteria. | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. A position is selected and convincingly supported. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 6

Developing Models

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. A clear explanation is made of how the model will demonstrate the science concepts it is intended to show. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. A clear plan for the model is drawn. The plan shows dimensions and parts. Metric measurement is used. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The plan includes an explanation of how the model simulates the real item. The explanation includes a description of how the model differs from the real item. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The constructed model is sturdy and simulates the elements of the real item that it was intended to simulate. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Colour, labels, and other such devices clarify what the model is intended to show. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The model is neat and presentable. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The model is safe to use. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 7**Scientific Drawing**

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. Appropriate and accurate details of structure are shown. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The drawings show several views of the object so that all of it is represented in the drawings. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Drawings use firm, continuous lines and dark areas with stippling (small dots made with a pencil to indicate shading). | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. All drawings use the same scale, which is shown clearly. The scale is metric. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Accurate details of colour, pattern, texture, and/or other physical characteristics are shown. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. If applicable, the relationship of the object to its surroundings is shown and is accurate. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. If applicable, the relationship between the structure and function of the object is shown and is accurate. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Text accompanies the drawing and explains the science that the drawing is intended to show. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Labels are used accurately. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Labels are printed to the right of the diagram, with straight lines drawn to the indicated part. | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Drawings are neat and presentable. | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Drawings use the space of the paper well. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 8**Science Fair Display**

| Element | Assessment | |
|--|--------------------------|--------------------------|
| | Self | Teacher's |
| <i>Background</i> | | |
| 1. A concise statement of the background for the problem is made clearly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The hypothesis and specific prediction are stated clearly. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Procedure</i> | | |
| 3. The description of the procedure used is clear and includes the following: | <input type="checkbox"/> | <input type="checkbox"/> |
| (a) Identification of manipulated and responding variables | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) Description of how the manipulated variable was varied and measured | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) Description of how the responding variable was measured | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) Strategy for keeping other variables constant | <input type="checkbox"/> | <input type="checkbox"/> |
| (e) Strategy for having a control | <input type="checkbox"/> | <input type="checkbox"/> |
| (f) Strategy for repeated trials | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Data</i> | | |
| 4. Charts and/or tables are done correctly, neatly, and accurately. (See Assessment Checklist 18, Data Table.) | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Graphs are done neatly and accurately. (See Assessment Checklist 19, Graph from Data.) | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Data analysis is correctly summarized. | <input type="checkbox"/> | <input type="checkbox"/> |

(continued)

ASSESSMENT CHECKLIST 8**Science Fair Display** (continued)

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| <i>Conclusion</i> | | |
| 7. The major findings are stated clearly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Key points of interpretation are made. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Questions for further study are stated. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. A bibliography page is provided. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Other</i> | | |
| 11. Text contains no errors in use of language. | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Graphics are attractive and legible and add to the clarity and interest of the display. | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Props add to the clarity and interest of the display. | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. The display has an overall effect of being clear and interesting. | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. The experimenter answers questions about the experimental design. | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. The experimenter answers questions about the science behind the experiment. | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. All guidelines for the science fair are followed. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 9

Oral Presentation

| Element | Assessment | |
|--|--------------------------|--------------------------|
| | Self | Teacher's |
| <i>Content</i> | | |
| 1. Science concepts are used accurately. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Accurate supporting details explain the concepts. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The vocabulary is appropriate to both the science content and the audience. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Visuals, including pictures, diagrams, photographs, videos, flow charts, and other props, are used effectively to support the presentation. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. There is a clear beginning, an organized body, and a clear closure. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Presentation</i> | | |
| 6. Vocal qualities such as volume, articulation, and enthusiasm are good. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Positive humour is used appropriately. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Body language such as eye contact, posture, and body movements are used effectively. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. If equipment is used, it is organized before the presentation. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Attire is neat and presentable. | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. The speaker gives the audience time to think. | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. The speaker responds well to questions. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 10**Computer Slide Show Presentation**

| Element | Assessment | |
|--|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. The topic has been researched well. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Content is summarized into an outline (point form) format. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The content has been organized in a logical and sequential way. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. There is no more than one main idea on each slide. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Colour, text, and type font are consistent for all slides. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. There is an introductory and a concluding slide. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Use of pictures and video complements the text. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Space on each slide is used well. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. The slides have an appropriate amount of animation supplementing the content. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. The animation used in the presentation is consistent. | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. The presentation is attractive and professional. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 11**Poster**

| Element | Assessment | |
|--|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. The main theme is immediately clear. The title helps to identify the theme. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Appropriate and accurate main ideas support the theme. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Appropriate and accurate details support each main idea. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. There is a wholeness about the poster; it does not seem like a haphazard collection of information. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The information in the poster is accurate and shows that the student thoroughly understands the science concepts. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Space, shape, textures, and colours provide information and add to the overall effectiveness of the poster. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Pictures, photographs, drawings, diagrams, graphs, or other similar devices add to the overall effectiveness of the poster. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. The format of the poster is appropriate to the task and its intended audience. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. The poster accomplishes its purpose with its intended audience. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. The poster is neat and presentable. | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. The poster is creative and interesting. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 12

Classification System

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. The characteristics chosen begin with the most general and logically proceed to the most specific. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The characteristics chosen are part of the essential nature of the objects being classified. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Each criterion (plural <i>criteria</i>) in the classification system is specific. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Several people can use the classification system with the same set of objects and classify them in the same way. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. New objects that are related can be classified using this classification system. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The classification system can be modified to work with new objects that have not been previously classified but are related to the original set. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 13

Concept Map

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. The set of concept words in the graphic organizer applies to the science topic. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The set of concept words is organized from most general to most specific. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. There is a suitable number of levels (general to specific) of concept words. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Valid cross links are made between concept words in different parts of the concept map. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The linking words (on the lines) used to make the cross links make sense in terms of the relationships being made between those concept words. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The concept map has an effective title. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The concept map is easy to follow. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Prior knowledge and new knowledge are shown. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. The concept map is neat and presentable. | <input type="checkbox"/> | <input type="checkbox"/> |

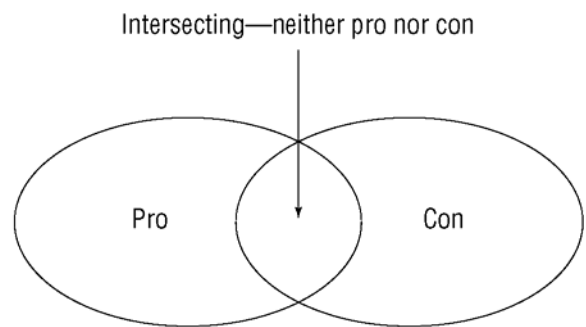
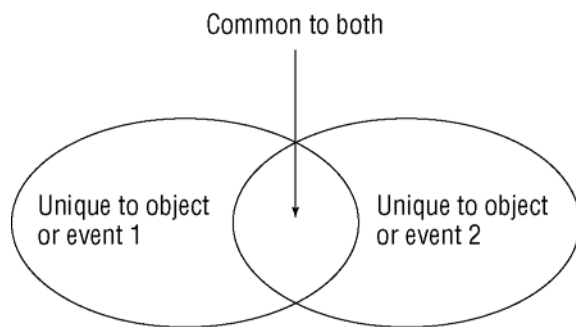
ASSESSMENT CHECKLIST 14**Events Chain or Flowchart**

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| <i>Items in an Events Chain or Flowchart</i> | | |
| 1. The items included are accurate. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The collection of items shows thoughtful selection of the most important elements. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Each item is stated clearly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The sequence is logical. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The title catches attention and accurately prepares the reader for the information in the chart. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Geometric forms, colours, textures, arrows, and other techniques add meaning and clarity to the events chain or flowchart. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The events chain or flowchart is neat and presentable. It is neither overcrowded nor too sparse. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. The events chain or flowchart communicates well with its intended audience. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>The Written Explanation of Each Item</i> | | |
| 9. The main idea is stated clearly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Sufficient supporting details explain the main idea. | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Language is used correctly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. The writing is neat, presentable, and concise. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 15

Venn Diagram

| Element | Assessment | |
|---|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. The objects or events to be compared are stated clearly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. A thoughtful list of characteristics unique and important to object or event number 1 is made. Appropriate and accurate information has been used to make this list. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. A thoughtful list of characteristics unique and important to object or event number 2 is made. Appropriate and accurate information has been used to make this list. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The characteristics chosen to contrast the objects or events show a clear understanding of the science involved. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. A list of important characteristics common to the objects or events being compared is made. Appropriate and accurate information has been used to make this list. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The common set of characteristics chosen shows a clear understanding of the science involved. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. There is a priority order within the lists that shows an understanding of what is important to the task at hand. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. The Venn diagram is neat and presentable. | <input type="checkbox"/> | <input type="checkbox"/> |



ASSESSMENT CHECKLIST 16**Science Portfolio**

| Element | Assessment | |
|--|--------------------------|--------------------------|
| | Self | Teacher's |
| <i>The Portfolio as a Whole</i> | | |
| 1. The collection of items demonstrates thinking skills and creativity in science. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The collection of items shows understanding of the scientific process. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The collection of items shows well-made models and inventions. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The collection of items demonstrates thoughtful connections made between science and other school subjects. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The collection of items shows that good amount of adequate reading or viewing of materials related to science was done. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The portfolio has a clearly labelled cover including the student's and teacher's names. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The portfolio shows an understanding of the concepts, skills, and work habits important to the class. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Categories for the Contents of the Portfolio</i> | | |
| 8. The collection of items in each category shows a wide range of work. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. The index for each category is clear. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. The self-reflective narrative in each category addresses strengths and weaknesses in that category. | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. The self-reflective narrative in each category shows how improvement was made. | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. The self-reflective narrative in each category tells about plans for further development in that category. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 17**Science-Math Connect**

| Element | Assessment | |
|--|--------------------------|--------------------------|
| | Self | Teacher's |
| <i>Understanding the Problem</i> | | |
| 1. The problem is clearly defined by being restated. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Given information is identified. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Information that must be assumed is listed. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Information that must be obtained is listed. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Where appropriate, a clear diagram is drawn that shows the important elements of the problem. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Solving the Problem</i> | | |
| 6. The algebraic formula(s) for this problem are listed. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The formula(s) are rearranged correctly to solve for the unknown quantity. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Arithmetic operations are used accurately. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. All values are labelled. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Reasoning can be followed easily by the sequence of arithmetic operations. | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. The answer is correct and labelled correctly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. The answer is reasonable according to the assumptions and reasoning used. | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>Communicating the Result</i> | | |
| 13. A clear, concise statement of the problem, the strategy for the solution, and the answer are given. Math vocabulary is used correctly. | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Where necessary, a labelled diagram is used to support the written statement. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 18

Data Table

| Element | Assessment | |
|--|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. The data table carries the appropriate data. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. An effective title for the data table is provided. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The information in the data table columns is clearly organized and labelled. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Units of measurement for all variables are clearly indicated. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Data for the manipulated and responding variables are clearly indicated. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Accuracy of the data is reasonable according to the measuring equipment or instrument being used. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Data from multiple trials of the manipulated variable are clearly shown. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. The data table is neat and presentable. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 19

Graph from Data

| Element | Assessment | |
|--|--------------------------|--------------------------|
| | Self | Teacher's |
| 1. An appropriate type of graph is used. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Appropriate starting points and intervals are used for each axis. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. A reasonable scale is used on each axis depending on the range of data for that axis. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. There is a main title for the graph, which clearly states the relationship between the axes. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Axes are clearly labelled. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Where applicable, the manipulated variable is put on the x -axis and the responding variable is put on the y -axis. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The data are plotted accurately. Where applicable, a line of best fit is used. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Colours, textures, labels, or other features are employed to make the graph easier to read. | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. If necessary, a key is provided. | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. The graph is neat and presentable. | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 21

Project Self-Assessment

Project: _____

| Group Members' Names | Role |
|----------------------|-------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

Group's Goal for Project

Survey

1. How did this project add to your knowledge about Science, Technology, and Society?

2. Fill in the chart on page 2, and then suggest some ways you could ensure a group is successful.

ASSESSMENT CHECKLIST 21

Project Self-Assessment (continued)

What to Do

– Complete the chart below. Use a check mark (✓) to show how you feel about each statement in the first column of the chart. In the last column of the chart, write a comment to explain why you feel that way.

| Statement | I disagree strongly | I disagree | I agree | I agree strongly | Why I agree or disagree |
|--|---------------------|------------|---------|------------------|-------------------------|
| I contributed to group discussions and listened to others in my group. | | | | | |
| My ideas, knowledge, and opinions were important to my group. | | | | | |
| I helped my group solve disagreements. | | | | | |
| I kept our goal in mind throughout our project. | | | | | |
| I fulfilled my role. | | | | | |
| I made sure I prepared what I said I would—and prepared it on time. | | | | | |
| I helped others in my group. | | | | | |
| My material included a variety of media. | | | | | |
| I learned from others in my group and in other groups. | | | | | |

ASSESSMENT CHECKLIST 22

Project Group Assessment

Project: _____

What to Do

- Answer the survey below without discussing your answers with other group members.
- Complete the chart on the next page without discussing your answers with other group members. Use a check mark (✓) to show how you feel about each statement in the first column of the chart. In the last column of the chart, write a comment to explain why you feel that way.

Survey

1. Describe how your group organized itself so that everything would get done for this project. Explain how well you think your method worked.

2. Describe a difference of opinion or approach experienced by your group and how you handled this disagreement.

3. List at least three things you could do differently in your next group project.

(continued)

ASSESSMENT CHECKLIST 22

Project Group Assessment (continued)

| Statement | I disagree strongly | I disagree | I agree | I agree strongly | Why I agree or disagree |
|---|---------------------|------------|---------|------------------|-------------------------|
| Our group supported and encouraged me and others in the group. | | | | | |
| Everyone in our group shared their ideas and information with each other. | | | | | |
| Members of our group, including me, willingly accepted tasks. | | | | | |
| Members of our group checked with me and each other often. | | | | | |
| Everyone worked together to meet our group goal. | | | | | |
| Members of our group took their roles seriously. | | | | | |
| Our group shared responsibility for preparing and presenting our results. | | | | | |

ASSESSMENT CHECKLIST 23

Learning Skills

| | Level 1 (rarely) | Level 2 (sometimes) | Level 3 (routinely) | Level 4 (always) |
|--|-----------------------------|--------------------------------|--------------------------------|-----------------------------|
| Works Independently | | | | |
| • accomplishes task independently | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • accepts responsibility for completing tasks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • follows instructions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • regularly completes assignments on time and with care | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • demonstrates self-direction of learning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • independently selects, evaluates, and uses appropriate learning materials, resources, and activities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • demonstrates persistence in bringing tasks to completion | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • uses time effectively | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • uses prior knowledge and experience to solve problems and make decisions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • reflects on learning experiences | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Teamwork | | | | |
| • responds and is sensitive to the needs and welfare of others | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • solves problems collaboratively | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • takes responsibility for his or her own share of the work to be done | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • works to help achieve the goals of the group or the class | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • helps to motivate others, encouraging them to participate | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • contributes information and ideas to solve problems and make decisions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

(continued)

ASSESSMENT CHECKLIST 23**Learning Skills** (continued)

| | Level 1 (rarely) | Level 2 (sometimes) | Level 3 (routinely) | Level 4 (always) |
|--|----------------------------|-------------------------------|-------------------------------|----------------------------|
| Works Interdependently | | | | |
| • questions the ideas of the group to seek clarification, test thinking, or reach agreement | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • shows respect for the ideas and opinions of others in the group or class | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • in discussions, paraphrases points of view and asks questions to clarify meaning, support, or praise | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • recognizes the contribution of group members by means of encouragement, support, or praise | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • seeks consensus and negotiates agreement before making decisions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • over the unit, experiments with different roles in the group | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Work Habits/Homework | | | | |
| • completes homework on time and with care | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • puts forth consistent effort | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • follows directions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • shows attention to detail | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • uses materials and equipment effectively | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • begins work promptly and uses time effectively | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • perseveres with complex projects that require sustained effort | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • applies effective study practices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

(continued)

ASSESSMENT CHECKLIST 23**Learning Skills** (continued)

| | Level 1 (rarely) | Level 2 (sometimes) | Level 3 (routinely) | Level 4 (always) |
|--|-----------------------------|--------------------------------|--------------------------------|-----------------------------|
| Initiative | | | | |
| • seeks out new opportunities for learning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • responds to challenges and takes risks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • demonstrates interest and curiosity about concepts, objects, events, and resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • seeks necessary and additional information in print, electronic, and media resources | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • identifies problems to solve, conducts investigations, and generates questions for further inquiry | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • requires little prompting to complete a task, displaying self-motivation and self-direction | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • approaches new learning situations with confidence and a positive attitude | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • develops original ideas and devises innovative procedures | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • attempts a variety of learning activities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • seeks assistance when needed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • uses information technologies in creative ways to improve learning for self or others | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

ASSESSMENT CHECKLIST 24

K-W-L Assessment Checklist

| Elements | Assessment | |
|---|------------|-----------|
| | Self | Teacher's |
| Number of Points in <i>What I Know</i> Quality of Points in <i>What I Know</i> | | |
| Number of Points in <i>What I Want to Learn</i> Quality of Points in <i>What I Want to Learn</i> | | |
| Number of Points in <i>What I Learned</i> Quality of Points in <i>What I Learned</i> | | |

ASSESSMENT CHECKLIST 25

Safety Checklist

What to Do

After a project or activity, record how safely you used science apparatus by placing one of the following marks beside each safety rule.

- Place a ✓ if you followed the procedure or took the precaution described.
- Place an × if you forgot to or did not follow the rule.
- Put n/a if the procedure or precaution does not apply to the particular activity or project.
- Answer the question below.

Apparatus Used (e.g., chemicals, saw, glass) _____

| Safety Rule | ✓, ×, n/a | Any Observed Problem |
|---|-----------|----------------------|
| 1. I wore an apron, gloves, and protective eye or ear covering when needed. | | |
| 2. I secured loose hair, clothing, and jewellery. | | |
| 3. I asked the teacher to check my apparatus before I used it. | | |
| 4. I told the teacher about accidents as soon as I saw them. | | |
| 5. I kept the work area clean and tidy. | | |
| 6. I did not eat, drink, or taste anything in the science room. | | |
| 7. I left no machine running by itself and no open flame unattended. | | |
| 8. I spoke quietly and about work only. | | |
| 9. I cleaned my work area and hands when the class was over. | | |

In future, I can improve my safety record by doing the following:

PROCESS SKILLS RUBRIC 1

Developing Models

When assessing students' understanding and ability to apply modelling, consider if the student:

| | |
|--|----------|
| <ul style="list-style-type: none"> <input type="checkbox"/> creates a model that shows a thorough understanding of the concept <input type="checkbox"/> accurately identifies the key components of the system or process being modelled, with added detail <input type="checkbox"/> demonstrates a thorough understanding of the concept of scale or system <input type="checkbox"/> identifies and explains limitations of the model | 4 |
| <ul style="list-style-type: none"> <input type="checkbox"/> creates a model that shows an understanding of the concept <input type="checkbox"/> accurately identifies the key components of the system or process being modelled <input type="checkbox"/> demonstrates an understanding of the concept of scale or system <input type="checkbox"/> identifies and explains some limitations of the model | 3 |
| <ul style="list-style-type: none"> <input type="checkbox"/> creates a model that relates to the concept <input type="checkbox"/> identifies some of the key components of the system or process being modelled <input type="checkbox"/> demonstrates a basic or partial understanding of the concept of scale or system <input type="checkbox"/> identifies a few limitations of the model | 2 |
| <ul style="list-style-type: none"> <input type="checkbox"/> does not complete the task <input type="checkbox"/> identifies some of the components of the system or process <input type="checkbox"/> does not show understanding of the concept of scale or system <input type="checkbox"/> shows no evidence of awareness of the limitations of the model | 1 |

PROCESS SKILLS RUBRIC 2

Hypothesizing

When assessing students' understanding and ability to apply hypothesizing skills, consider if their experimental design:

| | |
|---|----------|
| <ul style="list-style-type: none"> <input type="checkbox"/> develops an insightful, testable hypothesis that considers all the variables involved and the relevant supporting evidence <input type="checkbox"/> questions the relevance of the hypothesis by considering the accuracy of the control and testing methods <input type="checkbox"/> communicates results of the experiment in a clear, accurate manner | 4 |
| <ul style="list-style-type: none"> <input type="checkbox"/> develops a testable hypothesis that considers some of the variables involved and the relevant supporting evidence <input type="checkbox"/> considers the accuracy of the control and testing methods <input type="checkbox"/> communicates results of the experiment reasonably accurately | 3 |
| <ul style="list-style-type: none"> <input type="checkbox"/> develops a testable hypothesis but needs teacher or peer help <input type="checkbox"/> considers some aspects of the problem <input type="checkbox"/> communicates results of the experiment in a partially accurate manner | 2 |
| <ul style="list-style-type: none"> <input type="checkbox"/> develops an hypothesis that is confusing or untestable <input type="checkbox"/> uses a testing method that is weak or does not relate to the problem <input type="checkbox"/> communicates the experimental results incompletely | 1 |

PROCESS SKILLS RUBRIC 3

Controlling Variables

When assessing students' understanding and ability to apply controls to variables, consider if the student:

| | |
|--|----------|
| <ul style="list-style-type: none"> <input type="checkbox"/> isolates all possible variables directly related to the outcome of an experiment <input type="checkbox"/> maintains a high level of quality control for the fair testing of outcomes <input type="checkbox"/> identifies quantities of key factors and any possible relationships as relevant variables in a test | 4 |
| <ul style="list-style-type: none"> <input type="checkbox"/> isolates variables directly related to the outcome of an experiment <input type="checkbox"/> maintains quality control for the fair testing of outcomes <input type="checkbox"/> identifies quantities of key factors as relevant variables in a test | 3 |
| <ul style="list-style-type: none"> <input type="checkbox"/> isolates some variables related to the outcome of an experiment <input type="checkbox"/> attempts fair testing of outcomes <input type="checkbox"/> identifies some quantities of key factors as relevant variables in a test | 2 |
| <ul style="list-style-type: none"> <input type="checkbox"/> does not control variables <input type="checkbox"/> maintains little or no quality control during testing <input type="checkbox"/> does not identify key factors | 1 |

PROCESS SKILLS RUBRIC 4

Problem Solving

When assessing students' understanding and ability to apply problem-solving skills, consider if their experimental design:

| | |
|--|----------|
| <ul style="list-style-type: none"> <input type="checkbox"/> considers all aspects of the problem and makes a plan to solve it <input type="checkbox"/> carries out the plan creatively with testing and modification to solve the problem <input type="checkbox"/> modifies existing technology to solve a problem using creative solutions | 4 |
| <ul style="list-style-type: none"> <input type="checkbox"/> identifies the problem and makes a plan to solve it <input type="checkbox"/> carries out the plan with testing and modification to solve the problem <input type="checkbox"/> modifies existing technology to solve a problem | 3 |
| <ul style="list-style-type: none"> <input type="checkbox"/> attempts to identify the problem and make a plan to solve it <input type="checkbox"/> attempts to carry out the plan using different steps to solve the problem <input type="checkbox"/> attempts to make modifications to existing technology to solve a problem | 2 |
| <ul style="list-style-type: none"> <input type="checkbox"/> features a confusing plan or does not identify a problem <input type="checkbox"/> features a weak testing method or method that does not relate to the problem <input type="checkbox"/> does not attempt modifications | 1 |

PROCESS SKILLS RUBRIC 5

Fair Testing

When assessing students' understanding and ability to conduct a fair test of an experiment, consider if the student:

| | |
|--|----------|
| <ul style="list-style-type: none"> <input type="checkbox"/> demonstrates a thorough understanding of variables and controls and is able to list all possible variables in an experiment <input type="checkbox"/> can suggest a list of creative experiments where variables can be identified <input type="checkbox"/> ensures that experiments performed are tested fairly | 4 |
| <ul style="list-style-type: none"> <input type="checkbox"/> is able to list the variables that can be changed in an experiment <input type="checkbox"/> can suggest a list of experiments where variables can be identified <input type="checkbox"/> is able to report on the fairness of an experiment | 3 |
| <ul style="list-style-type: none"> <input type="checkbox"/> is able to list some of the variables that can be changed in an experiment <input type="checkbox"/> can suggest a few experiments where variables can be identified <input type="checkbox"/> is able to explain some aspect of the fairness of an experiment | 2 |
| <ul style="list-style-type: none"> <input type="checkbox"/> is unable to identify the variables of an experiment <input type="checkbox"/> is unable or incorrectly suggests experiments where variables can be identified <input type="checkbox"/> does not consider fair testing of an experiment | 1 |

PROCESS SKILLS RUBRIC 6

Designing Experiments

When assessing students' understanding and ability to design experiments, consider if the student:

| | |
|--|----------|
| <input type="checkbox"/> is able to identify all the steps in an experiment and reach a logical conclusion based on the results observed | 4 |
| <input type="checkbox"/> is able to identify all the steps in an experiment | 3 |
| <input type="checkbox"/> is able to identify most of the steps in an experiment | 2 |
| <input type="checkbox"/> is unable to correctly identify the steps in an experiment | 1 |

PROCESS SKILLS RUBRIC 7

Predicting

When assessing students' ability to make predictions, consider if the student:

| | |
|--|----------|
| <ul style="list-style-type: none"> <input type="checkbox"/> makes clear observations of relevant events and patterns <input type="checkbox"/> is able to creatively refine and adapt initial predictions if necessary <input type="checkbox"/> makes thoughtful predictions backed with clear reasoning | 4 |
| <ul style="list-style-type: none"> <input type="checkbox"/> makes observations of events or patterns <input type="checkbox"/> is able to refine or adapt initial predictions if necessary <input type="checkbox"/> can back up predictions with reasons relevant to content | 3 |
| <ul style="list-style-type: none"> <input type="checkbox"/> makes observations that are somewhat related to the event <input type="checkbox"/> is able to make limited adaptation of initial predictions <input type="checkbox"/> is able to explain some of the reasons behind predictions | 2 |
| <ul style="list-style-type: none"> <input type="checkbox"/> is unable to make a prediction based on events <input type="checkbox"/> is unable to adapt or refine predictions <input type="checkbox"/> is unable to explain predictions | 1 |

PROCESS SKILLS RUBRIC 8

Interpreting Data

When assessing students' ability to interpret data, consider if the student:

| | |
|---|----------|
| <ul style="list-style-type: none"> <input type="checkbox"/> is able to gather all pertinent data <input type="checkbox"/> organizes and records data in a logical, careful manner <input type="checkbox"/> summarizes and communicates data in a manner that shows trends and relationships, and that points out inconsistencies | 4 |
| <ul style="list-style-type: none"> <input type="checkbox"/> is able to gather data <input type="checkbox"/> organizes and records data in a careful manner <input type="checkbox"/> summarizes data and communicates a reasoned explanation | 3 |
| <ul style="list-style-type: none"> <input type="checkbox"/> is able to gather some data <input type="checkbox"/> organizes and records the data <input type="checkbox"/> is able to give a summary of data collected | 2 |
| <ul style="list-style-type: none"> <input type="checkbox"/> collects little or no data or data are incorrect <input type="checkbox"/> data are not organized or recorded <input type="checkbox"/> is unable to summarize data | 1 |

PROCESS SKILLS RUBRIC 9

Questioning

When assessing students' ability to ask questions, consider if the student:

| | |
|---|----------|
| <ul style="list-style-type: none"> <input type="checkbox"/> asks well-crafted questions that demonstrate a range of thinking skills <input type="checkbox"/> devises questions that are descriptive of observations and that emerge logically from them <input type="checkbox"/> is able to justify in a thoughtful manner why a question could be used for future study | 4 |
| <ul style="list-style-type: none"> <input type="checkbox"/> asks questions that demonstrate a range of thinking skills <input type="checkbox"/> devises questions related to and emerging logically from observations <input type="checkbox"/> is able to justify why a question could be used for future study | 3 |
| <ul style="list-style-type: none"> <input type="checkbox"/> devises questions that demonstrate some prior thought <input type="checkbox"/> devises questions related to the task <input type="checkbox"/> is able to suggest a question for future study | 2 |
| <ul style="list-style-type: none"> <input type="checkbox"/> does not ask questions <input type="checkbox"/> devises questions not related to the task <input type="checkbox"/> is not able to suggest a question for future study | 1 |

PROCESS SKILLS RUBRIC 10

Measuring and Reporting

When assessing students' ability to measure and report their findings, consider if the student:

| | |
|---|----------|
| <ul style="list-style-type: none"> <input type="checkbox"/> is able to take precise, careful measurements <input type="checkbox"/> records and reports measurements with care and thoroughness <input type="checkbox"/> chooses the best measuring tool and standard unit to match the task | 4 |
| <ul style="list-style-type: none"> <input type="checkbox"/> is able to take precise measurements using a relevant standard unit <input type="checkbox"/> is able to record and report measurements with care and exactness <input type="checkbox"/> chooses an appropriate measuring tool and standard unit for the task | 3 |
| <ul style="list-style-type: none"> <input type="checkbox"/> takes measurements that are quite accurate using a standard unit <input type="checkbox"/> records and reports measurements with some care <input type="checkbox"/> chooses a measuring tool to match the task | 2 |
| <ul style="list-style-type: none"> <input type="checkbox"/> is unable to take measurements or measurements are inaccurate <input type="checkbox"/> does not record or report measurements <input type="checkbox"/> selects a measuring tool that does not match the task | 1 |

DATE:

NAME:

CLASS:

PROCESS SKILLS RUBRIC 11

Process Skills Rubric Template

Title: _____

Assessment of students' ability to:

| | |
|--|----------|
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 4 |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 3 |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 2 |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 1 |

Title: _____

Assessment of students' ability to:

| | |
|--|----------|
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 4 |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 3 |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 2 |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 1 |

ASSESSMENT RUBRIC 1

Concept Rubric

Performance Indicators

Level 1: Not yet within expectations

Level 3: Fully meets expectations

Level 2: Meets expectations (minimal level)

Level 4: Exceeds expectations

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|--|--|---|
| Understanding • is aware of basic concepts and principles | Student shows limited understanding and many misconceptions. | Student shows some understanding and few misconceptions. | Student shows good understanding and few misconceptions. | Student has good understanding and no misconceptions. |
| Analysis • interprets concepts without confusion | Student is unable to interpret concept. | Student's interpretation of the concept is unclear. | Student able to interpret concept clearly without confusion. | Student able to interpret concept with confidence. |
| Accuracy • explains concepts in full, with details | Student cannot explain concepts without prompts. | Student can explain concepts, with some inaccuracies. | Student can explain concepts accurately. | Student can explain concepts accurately, with details. |
| Application • recognizes science and technology in daily life | Student has no idea of a connection between concept and daily life. | Student can identify real-life examples with prompts. | Student can relate concepts to daily life. | Student can link concepts to daily life and suggest other applications. |
| Interpretation • differentiates fact from opinion in various contexts | Student accepts all presentations of fact and opinion as valid. | Student sometimes needs prompts to tell fact from opinion. | Student usually tells fact from opinion. | Student clearly differentiates fact from opinion and responds. |

ASSESSMENT RUBRIC 2

Science Notebook Rubric

Performance Indicators

Level 1: Not yet within expectations

Level 3: Fully meets expectations

Level 2: Meets expectations (minimal level)

Level 4: Exceeds expectations

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|---|--|---|---|--|
| Storage: • keeps notes in binder in sections | Student does not use binder. | Student keeps binder with little order. | Student notes are in order. | Student notes are organized and labelled in sections. |
| Notes • starts with date, title and numbers pages | Student never dates or titles notes or numbers pages. | Student rarely dates or titles notes without prompts. | Student usually dates and titles notes and numbers pages. | Student always dates and titles notes and numbers pages. |
| Headings • uses headings to organize material | Student never uses headings. | Student uses headings occasionally. | Student always uses headings. | Student uses headings and sub-headings. |
| Diagrams • draws in pencil • adds title, labels | Student diagrams are unintelligible. | Student rarely adds titles and labels without prompts. | Student usually draws in pencil and adds titles and labels. | Student always uses pencil, titles, and labels. |
| Body • information in entries is relevant to key concepts | Few entries relevant to key concepts. | Some entries are relevant, but many are not. | Most entries are relevant to key concepts. | All entries are relevant and cover all key concepts. |
| Format • follows write-up format assigned | Student shows little awareness of write-up requirements. | Student can compose write-ups, with some prompts. | Student write-ups show good application of assigned format. | Student applies formats to create clear and concise write-ups. |
| Language • uses science terms correctly | Student rarely uses science terms. | Student uses science terms poorly. | Student uses science terms without clear context. | Student uses science terms in correct context. |
| Assignments • corrects and keeps assignments | Student loses assignments. | Student rarely corrects assignments; stores them in binder. | Student corrects assignments and stores in binder. | Student stores and organizes corrected assignments. |

ASSESSMENT RUBRIC 3**Co-operative Group Work
Rubric**

Group Task _____

Performance Indicators

Level 1: Not yet within expectations

Level 3: Fully meets expectations

Level 2: Meets expectations (minimal level)

Level 4: Exceeds expectations

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|--|--|--|
| Preparation • completes tasks assigned by group | Student rarely completes tasks assigned by group. | Student occasionally completes tasks assigned by group. | Student usually completes tasks assigned by group. | Student always completes tasks assigned by group. |
| Punctuality • completes assigned tasks on schedule | Work is usually late, despite reminders. | Student needs reminders to do work on time. | Student usually does tasks on time without reminders. | Student does tasks on time without reminders. |
| Participation • participates willingly and actively | Student is present but does not participate. | Student participates with some prompting. | Student raises points with group. | Student raises points and offers feedback. |
| Motivation • shows enthusiasm for project and group members | Student is passive or negative. | Student shows some enthusiasm but is negative toward group members. | Student shows enthusiasm and is positive toward group members. | Student shows enthusiasm for project and motivates group members. |
| Listening • listens actively • responds to others | Student does not listen and interrupts often. | Student listens but rarely offers related ideas. | Student accepts others' ideas and offers relevant feedback. | Student listens to others' ideas and extends them at subsequent meetings. |
| Speaking • speaks respectfully within the group • communicates ideas and information clearly | Student shows little respect for group members. | Student shows little respect for the ideas of others but communicates own ideas clearly. | Student shows respect for the ideas of others but communicates own ideas poorly. | Student shows respect for others' ideas and opinions and communicates own ideas clearly. |
| Group Reasoning • provides support for own ideas • helps build consensus | Student has little foundation for own ideas and does not contribute to consensus. | Student can support own ideas but is rarely able to compromise. | Student debates well and works toward consensus. | Student supports and synthesizes group ideas for consensus. |

ASSESSMENT RUBRIC 4**Scientific Drawing Rubric**

Performance Indicators

Level 1: Not yet within expectations

Level 3: Fully meets expectations

Level 2: Meets expectations (minimal level)

Level 4: Exceeds expectations

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|--|--|--|---|---|
| Adherence to teacher's guidelines <ul style="list-style-type: none"> • name and date are present • drawing large enough to be clear • labels are clear • description is included with drawing • contrast is indicated where applicable | Student name or date is missing; drawing size is inappropriate; labels are unclear; description is missing; contrast is missing. | Drawing size is inadequate; some labels or descriptions are missing; contrast is poor. | Drawing is required size; labels and descriptions are present; contrast is shown. | Drawing is required size; all labels and descriptions are present and detailed; good contrast is shown. |
| Accuracy <ul style="list-style-type: none"> • is accurate | Drawings are rarely accurate. | Drawings are fairly accurate but are confusing. | Drawings are an accurate representation of the subject. | Drawings clearly present the subject at a glance. |
| Completeness <ul style="list-style-type: none"> • drawing has all required elements • labels are complete | Drawings lack some elements or details; labels are incomplete. | Drawing includes all elements but lacks details; does not include all labels. | Drawing includes all elements and details; labels could be improved. | Drawing includes all elements and details; all labels are clear and complete. |

ASSESSMENT RUBRIC 5

Conduct an Investigation Rubric

Performance Indicators

Level 1: Not yet within expectations

Level 3: Fully meets expectations

Level 2: Meets expectations (minimal level)

Level 4: Exceeds expectations

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|---|--|--|
| Follows Procedures <ul style="list-style-type: none"> selects materials according to procedure uses correct instruments completes all steps | Student is missing some materials, uses some instruments incorrectly, and misses some steps. | Student is missing some materials, uses some instruments incorrectly, or misses some steps. | Student collects all materials, uses instruments correctly, and completes all steps. | Student collects all materials, uses instruments correctly, and completes all steps independently. |
| Safety <ul style="list-style-type: none"> reads and follows safety precautions | Student ignores safety precautions. | Student works safely with prompting. | Student works safely without prompting. | Student automatically works safely. |
| Data Collection by Observation <ul style="list-style-type: none"> identifies variables makes and records detailed observations is systematic | Student can't identify variables; observations are random and disorganized. | Student can identify variables and make and record observations in tables and charts, if they are provided. | Student can identify variables and make and record observations in self-designed tables and charts. | Student can identify variables and make and record observations in tables and charts that show data trends. |
| Lab Etiquette <ul style="list-style-type: none"> maintains a clean area at all times returns all equipment and apparatus to storage cleans up thoroughly disposes of materials as directed | Student work area is messy; equipment is put away incorrectly without cleanup; materials are not disposed of. | Student work area is somewhat messy; equipment is put away properly but not well cleaned. Materials are disposed of carelessly. | Student work area is tidy; equipment is put away properly and fairly well cleaned. Materials are disposed of properly. | Student maintains a spotless area at all times; returns cleaned equipment to proper storage as soon as no longer needed; cleans up thoroughly; and disposes of materials properly. |
| Analysis of Data <ul style="list-style-type: none"> organizes data appropriately draws supportable conclusions by careful analysis of data collected | Student shows little awareness of how to organize data; no conclusions are reached. | Student can organize data but conclusions are weak. | Student can organize data and draw reasonable conclusions. | Student organizes data and draws conclusions based on data trends. |
| Report Presentation <ul style="list-style-type: none"> fixes spelling and grammatical errors hands in write-up that is neat, well-organized, and complete | Student report is incomplete, messy, and has grammar and spelling errors. | Student report is complete but poorly organized and has grammar and spelling errors. | Student report is neat, complete, and well-organized and has few grammar and spelling errors. | Student report is neat, complete, and well-organized with no spelling or grammar errors. |

Performance Indicators

Level 1: Not yet within expectations

Level 2: Meets expectations (minimal level)

Level 3: Fully meets expectations

Level 4: Exceeds expectations

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|--|--|---|
| Question/Hypothesis <ul style="list-style-type: none"> states question or problem clearly and in testable form states hypothesis in "if...then..." form hypothesis leads directly to an answer to the question or problem | <p>Question or problem absent or unclear.</p> <p>Hypothesis is stated poorly and not in correct form.</p> <p>Hypothesis unrelated to question or problem.</p> | <p>Question or problem statement is not in testable form.</p> <p>Hypothesis in correct form but not directly related to question or problem.</p> | <p>Question stated in testable form.</p> <p>Hypothesis in correct form.</p> <p>Hypothesis leads to answer of question.</p> | <p>Testable question stated clearly and succinctly.</p> <p>Hypothesis stated clearly and in correct form.</p> <p>Hypothesis clearly leads to answer to question or problem.</p> |
| Materials <ul style="list-style-type: none"> materials are consistent with materials list or are available materials are appropriate for the question/problem | <p>Some materials necessary for investigation are absent from list.</p> <p>Materials list contains some unnecessary items.</p> | <p>Materials list incomplete.</p> <p>Materials were appropriate for investigation.</p> | <p>Materials list included all necessary items and were available.</p> <p>Materials were appropriate.</p> | <p>Materials list included all necessary items as well as some creative items. All materials were appropriate.</p> |
| Safety <ul style="list-style-type: none"> safety precautions are clearly stated and list is complete safety precautions are adhered to throughout investigation | <p>Safety precautions are missing.</p> | <p>Safety precautions were inadequate.</p> <p>Some safety precautions were not followed.</p> | <p>All necessary safety precautions were stated and followed.</p> | <p>Safety precautions were clearly stated adhered to in detail.</p> |

| | | | | |
|---|---|---|---|---|
| <p>Design</p> <ul style="list-style-type: none"> design includes clear procedural steps in logical order design meets criteria stated in the investigation <ul style="list-style-type: none"> data collected by following the procedure will provide enough information to either support or refute hypothesis | <p>Procedure not written in steps.</p> <p>Design does not correspond to criteria.</p> <p>Data collected by following the procedure will not be adequate to draw a conclusion.</p> | <p>All necessary steps are not included in the procedure as written. Directions are not clear.</p> <p>Design does not meet all criteria.</p> <p>It will be difficult to collect adequate data by following steps as written.</p> | <p>Steps written clearly and in reasonable order.</p> <p>Design criteria are met in procedure.</p> <p>If data are collected according to the procedure, data will be adequate for drawing conclusions.</p> | <p>Steps written clearly and concisely and with some imagination.</p> <p>Design criteria fully met.</p> <p>Data will provide plenty of information to draw a supportable conclusion.</p> |
| <p>Data Collection</p> <ul style="list-style-type: none"> dependent, independent, and controlled variables are identified controlled variables are kept constant data is collected by following procedural steps | <p>No variables are identified.</p> <p>Need to control variables is ignored.</p> <p>Data is collected randomly.</p> | <p>Dependent and independent variables are identified.</p> <p>Controls are not mentioned.</p> <p>Following the procedure would produce some usable data.</p> | <p>All variables are identified.</p> <p>Controlled variables are kept constant.</p> <p>Good data can be collected if procedural steps are followed.</p> | <p>Variables are clearly defined and identified.</p> <p>Controlled variables are kept constant and values recorded.</p> <p>Excellent data can be collected by following the procedural steps.</p> |
| <p>Analysis</p> <ul style="list-style-type: none"> data is organized into tables, graphs, diagrams, or system appropriate for investigation summarized data is correctly interpreted major findings are stated clearly conclusion clearly indicates whether hypothesis was supported or refuted | <p>Data is jotted down randomly and not organized.</p> <p>No attempt to summarize or interpret data.</p> <p>No findings are stated.</p> <p>No real conclusion is stated; hypothesis cannot be supported or refuted.</p> | <p>Data is collected but is poorly organized. Tables and graphs are rarely prepared.</p> <p>Data is poorly interpreted.</p> <p>Major findings are not stated.</p> <p>Conclusions hint at support or refutation of hypothesis but not clearly.</p> | <p>Data is organized in tables, graphs, or diagrams.</p> <p>Interpretations are correct.</p> <p>Major findings are correctly stated.</p> <p>Conclusion indicates whether the hypothesis was supported or refuted.</p> | <p>Data is creatively organized in appropriate form.</p> <p>Data is summarized succinctly and correctly.</p> <p>Major findings are clearly expressed.</p> <p>Conclusion clearly indicates whether hypothesis is supported or refuted.</p> |

ASSESSMENT RUBRIC 7

Research Planning Rubric

Performance Indicators

Level 1: Not yet within expectations

Level 3: Fully meets expectations

Level 2: Meets expectations (minimal level)

Level 4: Exceeds expectations

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|---|---|---|
| Timing <ul style="list-style-type: none"> plans work to meet due dates | Student is unaware of the deadline. | Student is aware of the deadline but misses it by a few days. | Student is aware of deadline and can meet it through some extra work sessions close to the deadline. | Student plans and paces work in order to meet deadline during regular school hours. |
| Topic <ul style="list-style-type: none"> topic can be described clearly sub topics are defined topic is limited topic is relevant | Topic is described in broad, general terms. Topic is not directly related to the subject area. | Topic is relevant and described clearly but is too broad to be dealt with within the time frame. | Topic is relevant and described clearly. It is limited in scope. | Topic is relevant and described clearly. It is limited in scope. Topic is broken into sub-topics. |
| Search Skills <ul style="list-style-type: none"> search criteria are set out in advance to keep research focussed organizes search through use of key words | Student has not defined search criteria and has little idea of ways to organize information searches. | Student has defined search criteria in very broad terms and has not focussed information searches. | Student has detailed search criteria to focus on topic and has developed useful search strategies. | Student has search criteria for overall topic as well as sub-topics and demonstrates competence and creativity in information searches. |
| Prior Knowledge <ul style="list-style-type: none"> recognizes prior knowledge is aware of gaps | Student is unable to relate prior knowledge to the topic and is unaware of knowledge gaps. | Student is aware of prior knowledge and gaps. | Student has good grasp of knowledge and gaps. | Student has extensive prior knowledge and has applied it appropriately. Search plan covers gaps. |
| Resources <ul style="list-style-type: none"> finds information from variety of sources assesses sources for validity, objectivity resources are relevant to topic resources are accessible | Student finds tangentially related information from limited sources; does not assess it. | Student finds general information from various sources; shows little ability to assess validity of sources. | Student uses various sources and assesses validity of relevant source material. Chooses information sources that are difficult to find. | Student is good at searching for and assessing relevant data from many sources. Chooses accessible sources. |

ASSESSMENT RUBRIC 8**Research Project Rubric**

Performance Indicators

Level 1: Not yet within expectations

Level 3: Fully meets expectations

Level 2: Meets expectations (minimal level)

Level 4: Exceeds expectations

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|--|--|--|--|--|
| Topic Summary <ul style="list-style-type: none"> provides a clear theme for project | Student is unable to summarize the topic. | Student's summary is too long. | Student's summary is succinct but incomplete. | Student's summary is succinct and complete. |
| Logical Sequence <ul style="list-style-type: none"> body of report has logical flow, with headings linked to topic | Student report is poorly or not organized at all. | Student report is organized into sections, but there is no logical flow. | Student report is organized and has a logical flow. | Student report is organized; flow is guided by headings and subheadings. |
| Support for Topic <ul style="list-style-type: none"> provides details to support ideas deals with information that may contradict hypothesis or thesis | Student does not present enough relevant information to support hypothesis/thesis. | Student supports thesis with details but includes unrelated information. | Student gives detailed and convincing support of hypothesis/thesis. | Student gives detailed and convincing support of hypothesis/thesis and deals with contradictory information. |
| Reference Material <ul style="list-style-type: none"> uses materials from variety of disciplines citations are complete and accurate reference materials are not plagiarized | Student uses materials from few sources; few citations, which are incomplete. There is evidence of plagiarism. | Student uses materials from a variety of sources; citations are complete but inconsistent. | Student uses materials from a variety of sources; citations are complete and follow prescribed format. | Student uses materials from a variety of sources and disciplines; citations are complete and follow prescribed format. |
| Supporting Materials <ul style="list-style-type: none"> enhances report with variety of audio, visual, and electronic aids | Student uses few aids and presents in only one medium. | Student uses some aids in various media. | Student enhances report by linking aids in various media. | Student creates interest through good use of high quality aids in a variety of media. |
| Grammar <ul style="list-style-type: none"> finds and fixes mechanical and grammatical errors for final report | Student leaves serious grammar and spelling errors in report. | Student leaves few grammar and spelling errors in report. | Student report is usually free of grammar and spelling errors. | Student report is usually free of grammar and spelling errors. Use of language is varied and creative. |

ASSESSMENT RUBRIC 9

Communication Rubric

Performance Indicators

Level 1: Not yet within expectations

Level 3: Fully meets expectations

Level 2: Meets expectations (minimal level)

Level 4: Exceeds expectations

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|--|---|---|
| Vocabulary <ul style="list-style-type: none"> uses formal scientific and technological vocabulary relevant to grade level | Student does not use formal scientific and technological vocabulary relevant to grade level. | Student usually uses formal scientific and technological vocabulary relevant to grade level. | Student consistently uses formal scientific and technological vocabulary relevant to grade level. | Student always uses formal scientific and technological vocabulary relevant to grade level and makes use of specialized terms when appropriate. |
| Scientific Concepts <ul style="list-style-type: none"> summarizes and paraphrases concepts accurately | Student cannot discuss concepts. | Student repeats textbook language when discussing concepts. | Student can summarize scientific concepts accurately. | Student can summarize and paraphrase concepts in own words. |
| Supporting Visuals <ul style="list-style-type: none"> constructs and uses charts, tables, and graphs as supports | Student does not use charts, tables, or graphs as supports. | Student occasionally constructs and uses charts, tables, and graphs as supports. | Student constructs and uses charts, tables, and graphs as supports. | Student makes creative use of charts, tables, and graphs as supports. |
| Numeracy <ul style="list-style-type: none"> provides numerical data that are precise and in standard notation format data are in correct units | Student records numerical data with many errors. Format is difficult to understand. Units are inconsistent and wrong. | Student records data with some errors. Format is standard. Units are consistent but wrong. | Student records data free of errors, in suitable formats. Units are correct. | Student records data clearly, free of errors, in suitable formats. Units are consistent and correct. |
| Calculations <ul style="list-style-type: none"> completes calculations and draws accurate conclusions | Student unable to do accurate calculations or draw conclusions. | Student completes calculation but often draws wrong conclusions. | Student may calculate with minor errors but reaches good conclusions. | Student completes calculations and draws accurate conclusions. |
| Mechanics <ul style="list-style-type: none"> finds and fixes grammar and spelling errors in assignments | Student does not appear to review for grammar and spelling errors in assignments. | Student does not correct all grammar and spelling errors in assignments. | Student assignments rarely contain grammar or spelling errors. | Student assignments never contain grammar or spelling errors. |

ASSESSMENT RUBRIC 10

Multi-Media Presentation Rubric

Performance Indicators

Level 1: Not yet within expectations

Level 3: Fully meets expectations

Level 2: Meets expectations (minimal level)

Level 4: Exceeds expectations

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|--|---|--|---|--|
| Science Concepts | | | | |
| <ul style="list-style-type: none"> presents scientific concepts accurately | Student does not present scientific concepts coherently. | Student presents scientific concepts in textbook form; cannot respond to questions concerning concepts. | Student presents scientific concepts well; may have trouble expanding on them in response to questions. | Student presents scientific concepts in own words. Can answer questions from the audience concerning concepts. |
| Supporting Details | | | | |
| <ul style="list-style-type: none"> uses class and reference materials to support concepts | Student does not use materials to support concepts. | Student uses the textbook only to provide support. | Student uses a variety of class materials to provide support. | Student uses class and credible outside materials to provide support. |
| Use of Media | | | | |
| <ul style="list-style-type: none"> uses a variety of media (audio, visual, written, electronic) | Student uses only one form of media in presentation. | Student supports presentation with various media; media is not used well. | Student links detail in various media to presentation. | Student shows originality in use of multiple media. |
| Organization | | | | |
| <ul style="list-style-type: none"> begins and ends clearly body of information flows in orderly fashion | Presentation is poorly organized; no clear beginning or end. | Presentation starts and ends well; flow of ideas unclear. | Presentation has clear beginning and ending and good flow of information. | Presentation has clear beginning and ending; flow is creative and smooth. |
| Oral Component | | | | |
| <ul style="list-style-type: none"> speaks clearly, with varied pitch and tone chooses words appropriate for science and target audience stimulates interest or response from audience | <p>Student speaks in a low monotone; is difficult to hear.</p> <p>Student does not use appropriate science vocabulary.</p> <p>Audience is not interested.</p> | <p>Student speaks clearly but in a monotone.</p> <p>Student uses appropriate science vocabulary; at too high a level for audience.</p> <p>Audience is interested but struggling to understand.</p> | <p>Student speaks clearly and alters voice patterns.</p> <p>Student uses audience-appropriate science vocabulary.</p> <p>Audience is politely interested and has some response.</p> | <p>Student speaks clearly in an animated voice.</p> <p>Student uses audience-appropriate science vocabulary and reinforces meaning of more difficult terms.</p> <p>Audience is interested, enthusiastic, and responsive.</p> |
| Body Language | | | | |
| <ul style="list-style-type: none"> uses gestures, changes eye contact and changes posture | Student does not move during delivery. | Student moves during delivery; has trouble staying focussed as a result. | Student moves around well during delivery; eye contact with audience is good. | Student moves around well, makes varied eye contact, and is comfortable during the presentation. |

(continued)

ASSESSMENT RUBRIC 10

Multi-media Presentation

Rubric (continued)

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|--|---|--|--|---|
| Layout and Design | | | | |
| <ul style="list-style-type: none"> • use of space • size/placement of elements • use of fonts and colours • use of backgrounds, colours • consistent images • enhances message • effectively accomplishes purpose | Student uses few of the features layout and design features available in the media source to enhance understanding of the presentation. | Student uses one format consistently, however, layout and design choices create a presentation that is cluttered and/or a riot of competing colours, icons, image sizes, and animations. | Student uses a variety of available features. Effect is not entirely consistent and/or is somewhat distracting. | Student uses features of the tool or program in a consistent way and the design is unobtrusive. The overall effect is to enhance understanding of the material. |
| Use of Images, Sounds, Animations, and Video <ul style="list-style-type: none"> • purposeful • complement/enhance message or purpose • appropriate • effective | Student does not use images, sounds, animations, etc., as part of the presentation. | Student uses a variety of images, sounds, animations, etc., as part of the presentation. Not all are relevant; some are distracting. | Images, animations, and sounds are appropriate and effectively support and enhance the text message or purpose. | Images, animations, and sounds are interesting, well chosen, and support/enhance understanding of the text message or purpose. |
| Use of Charts, Tables, and Graphs <ul style="list-style-type: none"> • use of legends, keys, and labels • accurate • complete | Student does not present information in charts, graphs, or tables. | Student presents some information in charts, graphs, or tables. Labels and titles are unclear or incomplete. Not all styles are appropriate. | Charts, graphs, or tables are used to illustrate information. Label/titles are accurate and complete. Style of table or graph is appropriate to message. | Charts, graphs, or tables are used to illustrate information. Label/titles are accurate and complete. Style of table or graph is appropriate to message. Charts, graphs, or tables are used creatively. |

**ASSESSMENT
RUBRIC 11**

Using Tools, Equipment, and Materials Rubric

Performance Indicators

Level 1: Not yet within expectations

Level 3: Fully meets expectations

Level 2: Meets expectations (minimal level)

Level 4: Exceeds expectations

| Performance Criteria | Level 1 | Level 2 | Level 3 | Level 4 |
|--|--|--|---|--|
| Selection • chooses correct tools and materials | Student does not choose correct tools; needs help to find materials. | Student chooses correct tools; takes some time to find tools and materials. | Student makes correct choices and does so efficiently. | Student makes correct choices and does so efficiently. |
| Handling • handles tools and materials correctly • cleans and maintains tools | Student does not handle tools and materials well; does not ask for guidance. Student does not take care of tools or clean them. | Student needs frequent guidance in handling of tools and materials. Student takes some care of tools; does not clean them properly. | Student handles most tools and material correctly. Student takes good care of tools and makes an effort to clean them. | Student handles all tools and materials correctly. Student takes good care of tools and cleans them thoroughly. |
| Safety • observes procedures with little prompting | Student does not follow safety rules during activity and is careless of safety of others in the class. | Student needs frequent reminders to work safely during activity. Student needs to be reminded of others' safety. | Student usually follows rules during activity and clean-up. Student is aware of safety of others. | Student follows all safety rules during activity and clean-up. Student shows leadership in class safety. |
| Efficiency • uses materials and time with little waste | Student usually wastes time and materials. | Student needs guidance not to waste time and materials. | Student rarely wastes time or materials. | Student very efficient in use of time and materials. |
| Neatness • keeps work area tidy • cleans up after class | Student workspace/lab area is cluttered and messy. | Student needs to be reminded to keep workspace/lab area neat and clean. | Student usually has neat workspace/lab area and usually cleans up. | Student always has neat workspace/lab area and cleans up without prompts. |

