BC SCIENCE 9
TEACHER'S RESOURCE

ASSESSMENT

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McGraw-Hill Ryerson

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 the Prescribed Learning 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 *BC Science 9* match the Prescribed Learning 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

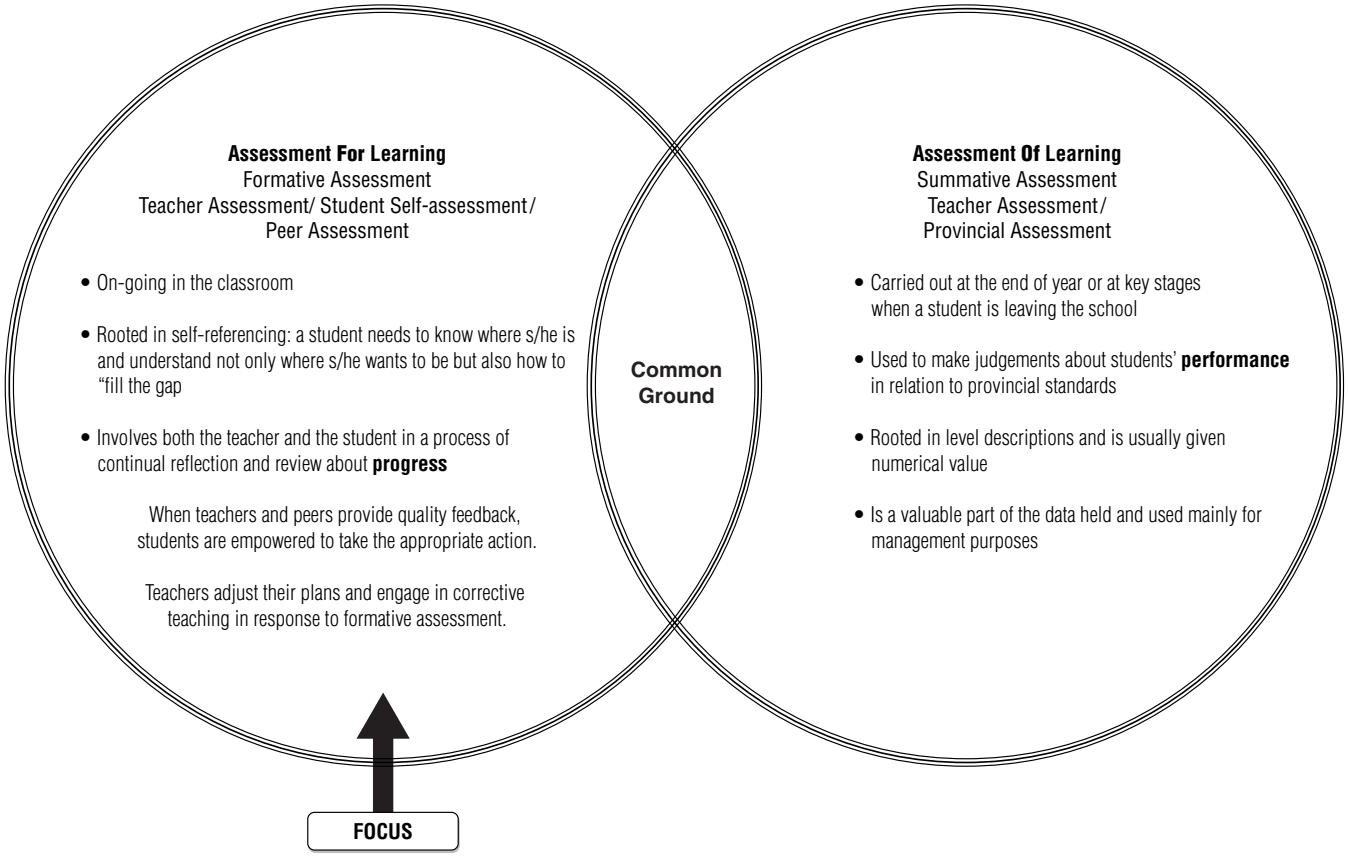
How Are Assessment and Evaluation Related?

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 *BC Science 9* 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



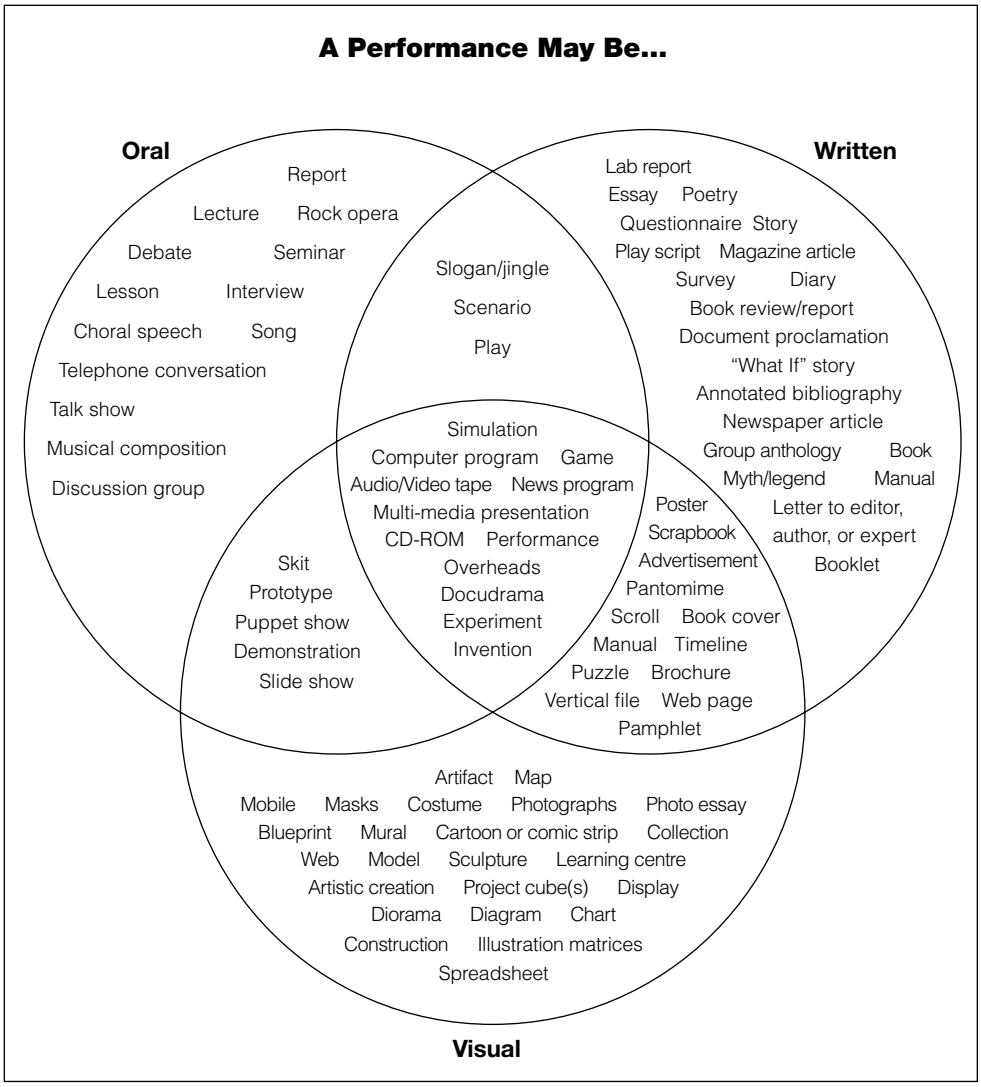
⇒ Over the past several months, when have you used formative assessment? What form did it take? What was its purpose? In what other ways could you use formative assessment?

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 the Prescribed Learning 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 Prescribed Learning 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 the Prescribed Learning 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 *BC Science 9* 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 *BC Science 9***
Science notebooks	• Used for reflection, expressing preferences or opinions, assessing attitudes, and assessing strengths and weaknesses	• Communicating • Applying specific knowledge • Scientific problem solving • Predicting	• Pause and Reflect questions in section and chapter reviews
Portfolios	• Include student work and their reflections on it • Often used for a specific focus (e.g., problem solving, review)	• Communicating • Learning skills	• Developed in *Teacher's Resource*
Observation	• Used during text-reading strategies, problem-solving activities, student presentations, and to monitor progress in the use of technology	• Problem solving • Learning skills • Observing • Classifying	• See *Teacher's Resource* for suggestions.
Pencil and paper tests	• Focus on knowledge but could include some thinking skills	• Knowledge	• Section Reviews and Chapter Reviews
Projects	• Apply knowledge to a real situation • Used for solving a "big" problem in a realistic context	• Designing experiments • Measuring and reporting • Problem solving • Modelling	• End-of-unit projects • Design Your Own Investigation
Interviews/Conferences	• Monitor progress • Used during large projects, portfolio work, other work in progress	• Communicating • Knowledge • Learning skills	• See *Teacher's Resource* for suggestions.
Activities/Investigations	• 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.	• Inquiry • Problem solving • Classifying • Modelling • Hypothesizing • Communicating • Designing experiments • Controlling variables • Fair testing	• Throughout student textbook and *Teacher's Resource*

Assessment Tools

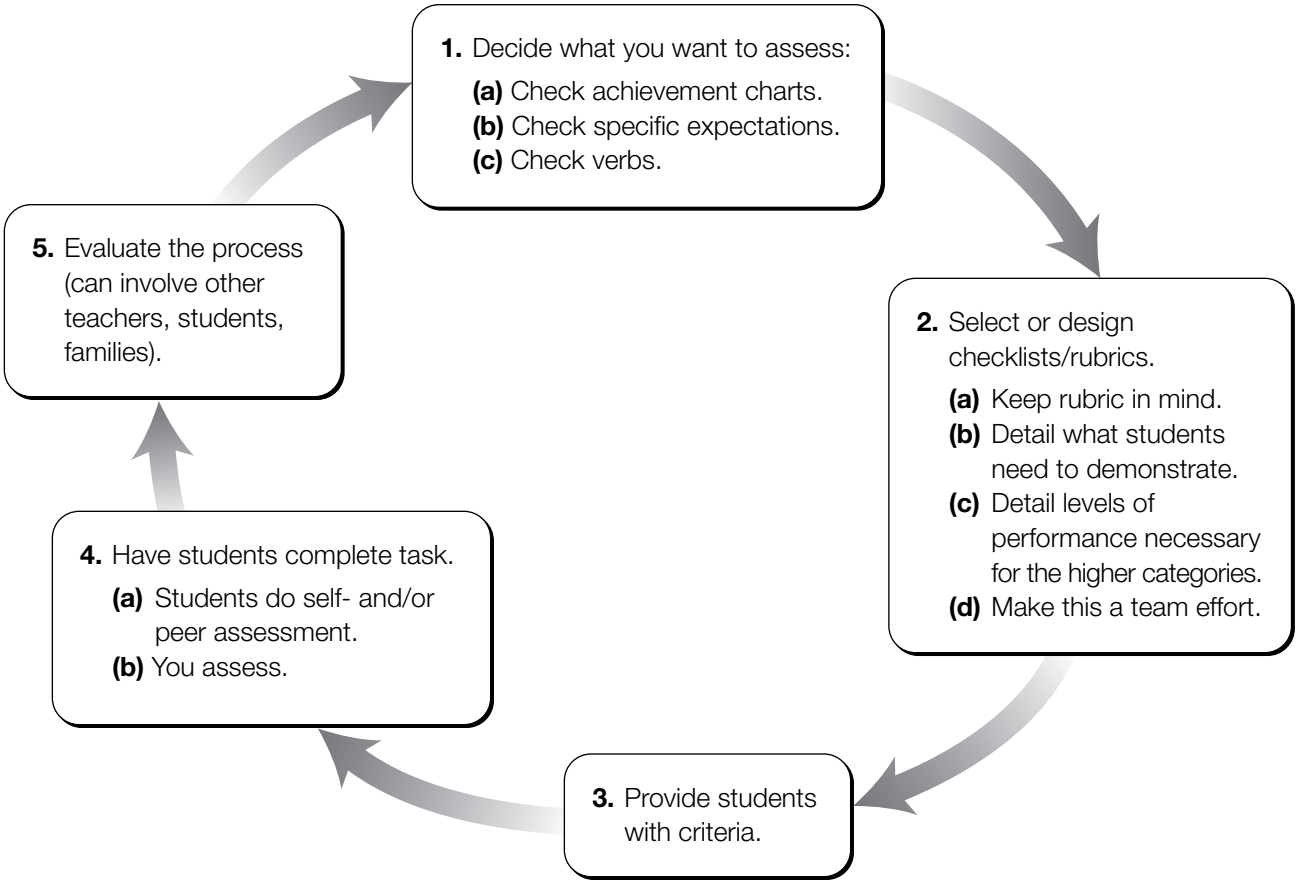
Just as there are many activities that help you to evaluate your students' knowledge, there are also a number of assessment tools. Assessment tools might include rubrics, checklists, observation notes, peer and self-assessment, and open-ended questions. This section includes Assessment Checklists and 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 IRP, 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 things 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 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: *Space Exploration*

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:
2. Understanding of procedure:
3. Write-up:
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: _____

_____

SPACE EXPLORATION	UNDERSTANDING BASIC CONCEPTS						INQUIRY AND DESIGN						COMMUNICATING REQUIRED KNOWLEDGE						RELATING SCIENCE TO TECHNOLOGY AND SOCIETAL ISSUES					
Class	QUIZ					TOTAL						TOTAL						TOTAL						TOTAL