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# PREFACE

Recent research studies have confirmed a belief that intuitive teachers have long held germane to classroom success: when students are meaningfully involved in active learning tasks and in the planning and evaluation of their work, they are more enthusiastic about instructional activities, they learn and retain more, and their overall rate of achievement is greater. With the emphasis placed on measurable achievement as an overriding goal in school systems, curriculum, classroom organisation and management, and even instructional practices and procedures, teachers are faced with great challenges. While striving to fulfil societal demands, at the same time they must be creating and using new instructional strategies, procedures and teaching methods to meet the diverse needs of students with widely varying interests and abilities. With the complexity of daily life in our rapidly changing world, the global economy, and the growing avalanche of information, middle years science teachers are turning to student-centred instruction, active learning strategies, and authentic instruction to capture and hold students' interests and attention, and consequently to result in increased achievement levels.

## Graphic Organisers

As the body of material to be covered in a given time frame grows more massive and multifaceted, and content demands on students and teachers multiply, graphic organisers are becoming an important component of middle years science programs.

In the information-saturated classroom of today, sorting and making meaningful use of specific facts, and concepts is becoming an increasingly important skill. Knowing where to go to find information and how to organise it once it is located is the key to processing and making meaningful use of the information gathered. Graphic organisers can be used to: provide visual organisation; develop scope and sequence; furnish a plan of action or to aid in assessment; clarify points of interest; and document a process or a series of events. Their construction and use encourages visual discrimination and organisation, use of critical thinking skills, and metacognitive reflection.

In other instances, a graphic organiser may be developed as a reporting or review exercise or sometimes as a means of self-assessment when properly used after knowledge has been acquired. Graphic organisers are valuable and effective instructional and assessment tools. The degree of their effectiveness for both students and teachers is determined by visual clarification of purpose, careful planning, visual organisation and attention to detail.

## Rubrics

Authentic assessment, as opposed to more traditional forms of assessment, gives both student and teacher a more realistic picture of gains made, and facts and information processed for retention. Emphasis is placed more on the processing of concepts and information than on the recall of facts. Collecting evidence from authentic assessment exercises in realistic settings over a period of time provides students and teachers with the most effective documentation of both skills and content mastery. Traditional measurements of student achievement such as written tests and quizzes, objective end-of-chapter tests, and standardised tests play a major role in the assessment picture as well.

The use of standards-based rubrics in middle years science classes has proven to be an extremely useful means of authentic assessment for helping students maintain interest and evaluate their own progress.

Rubrics are checklists that contain sets of criteria for measuring the elements of a product, performance or portfolio. They can be designed as a qualitative measure (holistic rubric) to gauge overall performance of a prompt, or they can be designed as a quantitative measure (analytic rubric) to award points for each of several elements in response to a prompt.

Additional benefits from rubrics are that they: require collaboration among students and teachers; are flexible and allow for individual creativity; make room for individual strengths and weaknesses; minimise competition; are meaningful to parents; allow for flexible time frames; provide multifaceted scoring systems with a variety of formats; can be sources for lively peer discussions and interaction; can include metacognitive reflection provisions which encourage self-awareness and critical thinking; and can help teachers determine final marks that are understood by and hold meaning for students.

## Writing Prompts

Over the past several years, the significance of journals and writing prompts has been well-documented by student and teacher observations. When students write about experiences, knowledge, hopes, fears, memories, and dreams, they broaden and clarify skills and concepts while acquiring new insights into themselves and the huge world of which they are a part.

While random journal entries hold their own place of importance in the science classroom, writing prompts designed to elicit specific responses play a vital role in the instructional program.

Journal entries may be presented in many different formats, and may be shared and assessed in a variety of ways. The flexibility of their use and the possibility they provide for integrating instruction make them an important component of the personalised science program. They may take the form of a file card project, a multimedia presentation, a special notebook or a diary. They may be private, to be discussed with the teacher only, or shared with a small group of peers or the total class. Word prompts can be used in parent–student–teacher conferences, or as take home projects to be shared with parents, saved, or used as a portfolio entry to give an account of a unit of study, field trip or independent project.

Writing prompts provide the opportunity for students to: create a dialogue with teachers in a meaningful sense; write about self-selected topics of high interest; process and internalise material being learned; communicate with peers; express private opinions, thoughts and insights without judgment or censorship; write personal reactions or responses to textbook, research assignments, group discussion and experiences; make records of what and how they are learning and what it means to them; develop a source book of ideas and thoughts related to a specific topic; question material being studied and record answers as they are uncovered; assess their academic or social progress; and engage in metacognitive reflection on new skills and concepts being acquired and record plans for further exploration.

These standards-based graphic organisers, writing prompts, and rubrics have been designed to provide busy teachers with a bank of resources from which to draw as the need arises. For ease in planning, the matrix on pages 122–123 provides a complete correlation of activities to science standards.

## Assessment Check List for the Physical World: Matter

Rating Scale:



**1. Student is able to identify and define these terms:**

Matter	Rating: _____	Weight	Rating: _____
States of matter	Rating: _____	Inertia	Rating: _____
Mass	Rating: _____	Density	Rating: _____

**2. Student is able to explain these laws:**

Law of conservation of mass	Rating: _____
Law of conservation of energy	Rating: _____
Law of conservation of mass–energy	Rating: _____

**3. Student is able to identify and define these terms:**

Atom	Rating: _____	Electron	Rating: _____
Solution	Rating: _____	Base	Rating: _____
Nucleus	Rating: _____	Element	Rating: _____
Compound	Rating: _____	Chemical change	Rating: _____
Proton	Rating: _____	Atomic number	Rating: _____
Molecule	Rating: _____	Physical change	Rating: _____
Neutron	Rating: _____	Mixture	Rating: _____
Acid	Rating: _____	pH scale	Rating: _____

**4. Student is able to describe and explain the organisation of the periodic table of elements.**

Rating: \_\_\_\_\_

**5. Student is able to demonstrate understanding of chemistry as the science of matter.**

Rating: \_\_\_\_\_

**6. Additional concepts student has learned:**

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