DOCUMENT ORGANIZATION

The prescribed learning outcomes and the suggestions for instruction, assessment, and learning resources contained within *Senior 2 Science: A Foundation for Implementation* provide teachers with a plan for helping students achieve the learning outcomes identified in *Senior 2 Science: Manitoba Curriculum Framework of Outcomes* (2001). The document is organized by clusters; Cluster 0: Overall Skills and Attitudes is followed by the four "thematic" clusters. In addition, the appendices comprise Student Learning Activities, Teacher Support Materials, and Blackline Masters. These complementary materials are designed to support, facilitate, and enhance student learning and assessment by being closely linked to the learning outcomes and the skills and attitudes.

Guide to Reading the Specific Learning Outcomes and the Four-Column Format

- The **Prescribed Learning Outcomes** identified in Column 1 outline the intended learning to be achieved by the student by the end of the course. They include the specific learning outcomes related to the thematic cluster in addition to the learning outcomes related to Cluster 0: Overall Skills and Attitudes, selected to correspond to the **Suggestions for Instruction**.
- Column 2 contains **Suggestions for Instruction** directly related to the achievement of the specific learning outcomes contained in the first column.
- Column 3 assists teachers with **Suggestions for Assessment** of the specific learning outcomes.
- Column 4 cites **Suggested Learning Resources** recommended to guide and support instruction, the learning process, and student assessment.
- **Teacher Background** information provides planning hints, special interest material, and depth of treatment on certain issues related to the learning outcomes. These are incorporated as text boxes in column two or three.

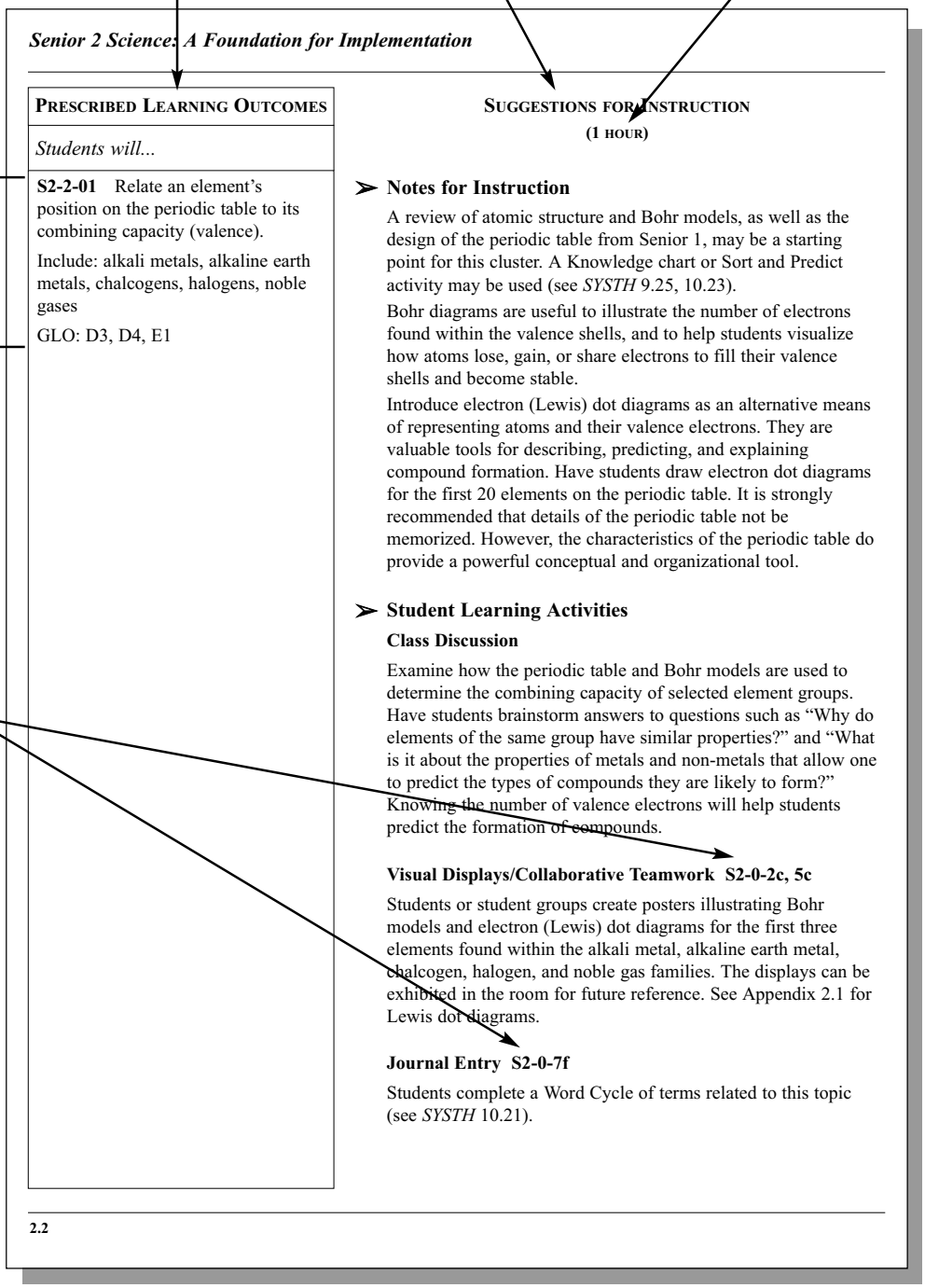
The pages that follow provide detailed clarification on reading the four-column format.

The Four-Column Format

Prescribed learning outcome statements that define what students are expected to achieve at the end of the course

Suggestions for student learning experiences directly related to the attainment of specific learning outcomes

Suggested time for instruction



Senior 2 Science: A Foundation for Implementation

PRESCRIBED LEARNING OUTCOMES	SUGGESTIONS FOR INSTRUCTION (1 HOUR)
Students will...	
S2-2-01 Relate an element's position on the periodic table to its combining capacity (valence). Include: alkali metals, alkaline earth metals, chalcogens, halogens, noble gases GLO: D3, D4, E1	➢ **Notes for Instruction** A review of atomic structure and Bohr models, as well as the design of the periodic table from Senior 1, may be a starting point for this cluster. A Knowledge chart or Sort and Predict activity may be used (see *SYSTH* 9.25, 10.23). Bohr diagrams are useful to illustrate the number of electrons found within the valence shells, and to help students visualize how atoms lose, gain, or share electrons to fill their valence shells and become stable. Introduce electron (Lewis) dot diagrams as an alternative means of representing atoms and their valence electrons. They are valuable tools for describing, predicting, and explaining compound formation. Have students draw electron dot diagrams for the first 20 elements on the periodic table. It is strongly recommended that details of the periodic table not be memorized. However, the characteristics of the periodic table do provide a powerful conceptual and organizational tool. ➢ **Student Learning Activities** **Class Discussion** Examine how the periodic table and Bohr models are used to determine the combining capacity of selected element groups. Have students brainstorm answers to questions such as "Why do elements of the same group have similar properties?" and "What is it about the properties of metals and non-metals that allow one to predict the types of compounds they are likely to form?" Knowing the number of valence electrons will help students predict the formation of compounds. **Visual Displays/Collaborative Teamwork S2-0-2c, 5c** Students or student groups create posters illustrating Bohr models and electron (Lewis) dot diagrams for the first three elements found within the alkali metal, alkaline earth metal, chalcogen, halogen, and noble gas families. The displays can be exhibited in the room for future reference. See Appendix 2.1 for Lewis dot diagrams. **Journal Entry S2-0-7f** Students complete a Word Cycle of terms related to this topic (see *SYSTH* 10.21).

2.2

Learning outcomes related to thematic clusters; includes connections to General Learning Outcomes

Learning outcomes related to Cluster 0, Overall Skills and Attitudes, selected to correspond to Suggestions for Instruction (see next section for detailed specific learning outcomes)

Suggestions for assessing specific learning outcome(s)

Suggestions for learning resources including print and information technology resources

Senior 2, Cluster 2: Chemistry in Action

Suggestions for Assessment

Rubrics/Checklists

See Appendix 6 for a variety of rubrics and checklists that can be used for self-, peer-, and teacher-assessment.

Visual Display S2-0-2c, 5c

Students or student groups present their posters. Repetition occurring for the number of valence electrons found within each of the families should be noted.

Journal Writing S2-0-7f

Assess journal entries using a Journal Evaluation form (see *SYSTH* 13.21).

Pencil-and-Paper Tasks

Students

- draw Bohr models of atoms when provided with their atomic mass and atomic number
- draw electron (Lewis) dot diagrams of atoms
- predict the number of valence electrons present in an atom from its position on the periodic table
- identify the location of the following families on the periodic table: alkali metals, alkaline earths, chalcogens, halogens, noble gases
- predict whether an atom will lose, gain, or share electrons, based on its position on the periodic table
- explain why atoms lose, gain, or share electrons
- complete a Word Cycle of the following terms: *valence, period, noble gas, periodic table, atom, metals, halogens, atomic number, family* (see *SYSTH* 10.21)

Teacher Background

Elements in the same group have similar properties because they have the same number of electrons in their outer shell. The outer electron shell of an atom is also known as the valence shell. The electrons in this shell are called valence electrons.

The arrangement of the valence electrons is key to understanding the formation of compounds. Chemical bonds form when atoms combine with other atoms by transferring or sharing electrons in an attempt to fill their valence electron shells.

Suggested Learning Resources

Science 10

5.5 Elements and the Periodic Table

BLM 5.5a Periodic Table of the Elements

Science Power 10

5.1 Looking for Patterns in Chemical Reactivity

BLM 5-2 ~~Periodic Table~~ Scavenger Hunt

BLM 5-3 Anatomy of an Atom

BLM 5-6 Electron Shells

BLM 5-9 Reviewing the Periodic Table of the Elements

SYSTH

9.25 Knowledge Chart

10.21 Word Cycle

10.23 Sort and Predict

13.21 Journal Evaluation

Appendices

2.1 Lewis Dot Diagrams

6.1 Rubric for the Assessment of Class Presentations

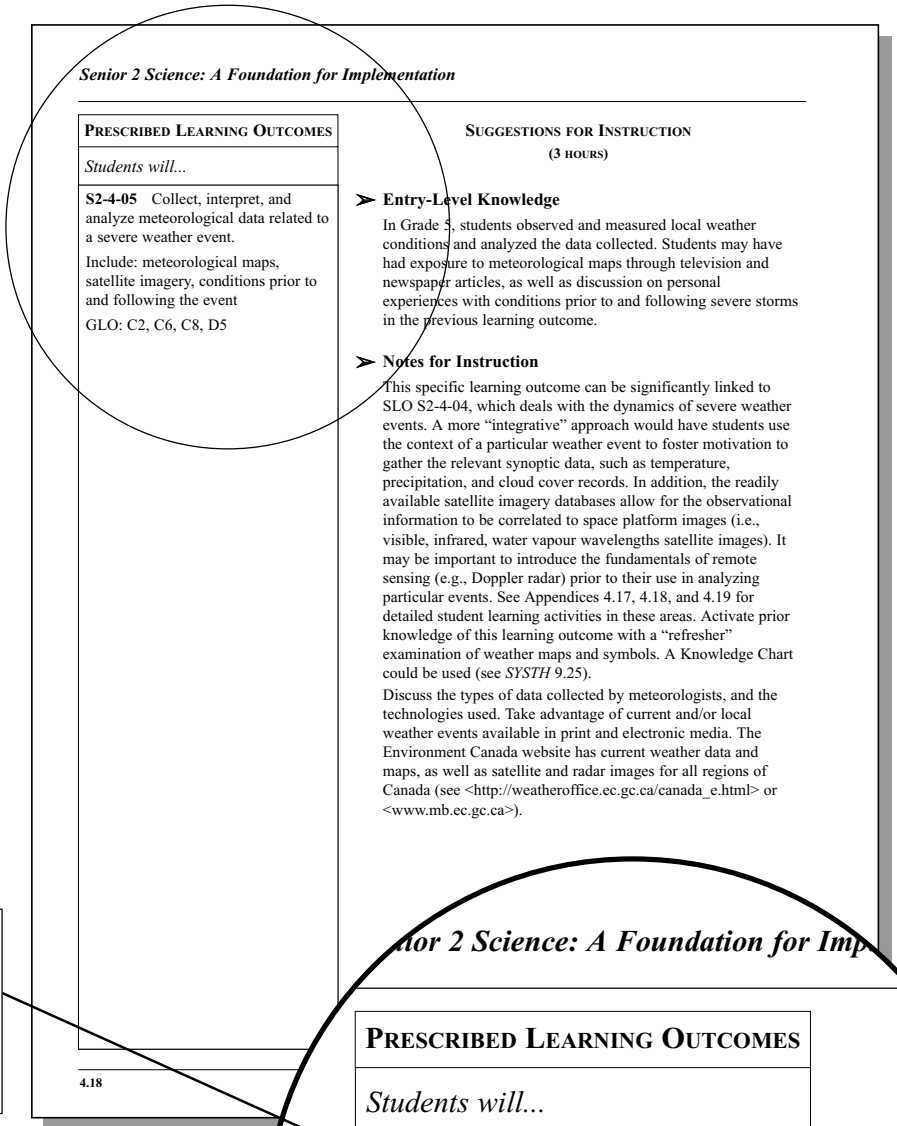
2.3

References to blackline masters (BLM) in print resources

References to *Senior Years Science Teachers' Handbook* to differentiate instruction

Background information and/or definitions for teachers, often beyond what students are required to know; safety information

Guide to Reading Specific Learning Outcomes



First digit indicates grade; second digit indicates cluster number; third digit(s) indicates specific learning outcome number

Examples: Provides ideas of what could be included (non-mandatory)

None given in this outcome.

Include: Indicates a mandatory component of the specific learning outcome

Cross-reference to general learning outcomes (See Appendix 6.11)