Activity Preparation for Chapter 2

Activity/Investigation	Advance Preparation	Time Required	Other Considerations
What's Going On? Measure the Mass of a Volume of Water (page 31) (TR page 43)	• 1 day before – Obtain 1 or 2 electronic scales and a class set of graduated cylinders. – Photocopy **BLM 2–2 Volume and the Overflow Method**.	• 10–15 min	• Consider dividing students into three groups. Have two thirds of the students work on page 33 and **BLM 2–1 Metric Worksheet**, if they have not done so earlier, while the others complete the activity. Rotate through the groups, allowing eight to ten minutes for each activity.
Try This! (page 33) (TR page 46)	• 1 day before – Obtain a golf ball. – Set up overflow apparatus. – Obtain small objects for students to test (preferably items that sink in water). • Day of – Photocopy **BLM 2–2 Volume and the Overflow Method**.	• 30 min	• You may wish to have students do the easier procedure that uses just a graduated cylinder and no overflow can; or you might want to have different groups of students try the two different methods and compare their experiences. • If any of the small objects float, use a pin or nail to push them just below the surface of the water.
Find Out: Compare Mass and Volume (page 34) (TR page 47)	• 1 day before – Gather materials. • Day of – Photocopy **Master 2 Safety Precaution Symbols**, and any assessment masters you decide to use.	• 30 min	
Find Out: Observing Without Seeing (page 38) (TR page 50)	• Several days before – Gather the mystery substances. • 1 day before – Put mystery substances in containers. Label the containers with numbers and record their contents. – Photocopy **Assessment Master 1 Co-operative Group Work Checklist** and **Assessment Master 2 Co-operative Group Work Rubric**.	• 30 min	• Try to get objects with a variety of textures and smells (e.g., wrapped pieces of cheese, peppermints, lemons or lemon peel, aromatic herbs such as lavender).
Find Out: Which Liquids Have High Viscosity? (page 42) (TR page 54)	• 2 to 3 days before – Have students brainstorm a list of common household chemicals, and then make choices from this list. – Obtain household chemicals. Consider asking students to bring in any liquids they want to test. – Ensure that bottles are clean and labels are intact. • 1 day before – If using, photocopy **Master 2 Safety Precaution Symbols**, and any assessment masters you decide to use.	• 40–45 min	• Some common products such as hairspray also have HHPS on them. You may want to include these in your choices. • Students may find household bottles without HHPS. Have them discuss which HHPS should appear and possible reasons manufacturers chose other formats for the information. • Consider making up a lab kit for each group that contains the required apparatus and materials.
Test It! What Labels Belong Where? (page 46) (TR page 58)	• 1 day before – Obtain required equipment and materials. – Prepare the 4 powders labelled 1, 2, 3, 4. – Fill dropper bottles with a testing liquid (vinegar and dilute iodine solution). – Photocopy any assessment masters needed.	• 60 min	• Consider making up a lab kit of the equipment for each group. Have students be responsible to return the exact amount of equipment in their lab kit.
Find Out: What Are the Properties of Slime? (page 48) (TR page 60)	• 1 day before – Prepare the glue and borax solutions. Glue: Mix equal quantities of glue and water. Borax: Prepare a borax solution with 5 mL of borax in 250 mL of water. – Photocopy **BLM 2–4 Slime Tests**, and any assessment masters you decide to use.	• 60 min	

Materials Needed for Chapter 2

Activity/Investigation	Apparatus	Materials	Blackline Masters
What's Going On? Measure the Mass of a Volume of Water (page 31) (TR page 43)	• 50 or 100 mL graduated cylinder • electronic scale	• water	**Recommended** BLM 2–2 Volume and the Overflow Method
Try This! (page 33) (TR page 46)	• 100 mL beaker (or an overflow can) • larger beaker (e.g., 1 L) • graduated cylinder • scales	• small solid objects that fit inside the 100 mL beaker or overflow can • water	**Recommended** BLM 2–2 Volume and the Overflow Method
Find Out: Compare Mass and Volume (page 34) (TR page 47)	• electronic scale, equal-arm balance, or triple beam balance • containers suitable to hold 500 g of each material	• at least 500 g of assorted materials (e.g., feathers, pebbles, sand, popcorn)	**Recommended** Master 2 Safety Precaution Symbols **Optional** Assessment Master 9 Safety Checklist Assessment Master 10 Safety Rubric Assessment Master 11 Using Tools and Equipment Checklist Assessment Master 12 Using Tools and Equipment Rubric
Find Out: Observing Without Seeing (page 38) (TR page 50)	• plastic jars with lids (6 per group) • blindfold per group	• assorted substances with different properties, smells, and textures (e.g., citrus peel, marshmallows, nails, tennis balls, ping pong balls, walnuts in shells, peppermints, licorice candies)	**Recommended** Assessment Master 1 Co-operative Group Work Checklist Assessment Master 2 Co-operative Group Work Rubric
Find Out: Which Liquids Have High Viscosity? (page 42) (TR page 54)	Each lab group requires: • support stand and ring • 3 foam cups • 2 – 50 mL graduated cylinders • sharpened pencil • stopwatch	• water • 15 mL of corn syrup per group • variety of liquids with different viscosities	**Optional** Master 2 Safety Precaution Symbols Assessment Master 3 Lab Report Checklist Assessment Master 4 Lab Report Rubric Assessment Master 12 Using Tools and Equipment Rubric
Test It! What Labels Belong Where? (page 46) (TR page 58)	Each lab group requires: • scoopula • magnifying lens • spot plate • dropper bottle	• 4 containers each containing one of the following powders: starch, baking soda, sodium chloride, glucose • iodine • vinegar • toothpicks	**Recommended** OHT A–8—A–9 Test It! What Labels Belong Where? **Optional** Assessment Master 7 Scientific Communication Checklist Assessment Master 8 Scientific Communication Rubric
Find Out: What Are the Properties of Slime? (page 48) (TR page 60)	Each lab group requires: • 50 mL graduated cylinder • 250 mL beakers • medicine dropper	• stir stick • plastic bag • glue (Elmer's works best) • borax dissolved in water • green food colouring	**Recommended** BLM 2–4 Slime Tests **Optional** Assessment Master 8 Scientific Communication Rubric Assessment Master 9 Safety Checklist Assessment Master 10 Safety Rubric Assessment Master 12 Using Tools and Equipment Rubric

CHAPTER 2 Describing Matter (page 30)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
15 min	• heavy and light objects such as textbooks, rocks, erasers, pens, pencils	BLM 2–1 Metric Worksheet

Overall Expectations

SILV.01 – illustrate how science is a part of daily life
SILV.02 – use appropriate scientific skills, tools, and safety procedures to investigate problems
SILV.03 – examine the connections between science and activities in daily life
CPMV.01 – explain the characteristics and classification of common materials, using appropriate scientific terminology
CPMV.02 – investigate the physical and chemical properties of common materials through laboratory activities
CPMV.03 – analyze how the use of various materials is based on their physical and chemical properties

Key Terms Teaching Strategies

Have students complete some or all of the following activities to help them learn and remember the two key terms:

- Write definitions for these terms in their Science Log. You may wish to have students keep a glossary at the back of their Science Log.
- Talk about how these words might be important in the chapter to come.

Activity Planning Notes

Use the introductory section to engage students in discussion about what is and what is not matter, and how matter can be measured and compared.

Energy and light are not matter because they do not have mass, but air is matter. Ask students how they could prove this. One distinction is that a cube of air could be trapped and weighed, but you could not do this with light and energy.

Students are often confused about the difference between matter and mass. Use the opening pictures to help students see that if the two objects have the same mass then they have the same amount of "stuff" or matter. This does not always mean the same volume. An illustration of an unbalanced balance with feathers and rocks is shown on page 34; have students compare and contrast that diagram with the balanced pans on page 30.

An active demonstration of the concept can be made by having one student act as a balance by standing up and holding out his or her arms similar to the balance pans. Have another student place objects in the balance student's left and right hands, and have the balance student give a mass reading by moving the hand with the heavier object down, and the hand with the lighter object up.

Consider using **BLM 2–1 Metric Worksheet** as an opening activity. The worksheet covers units and uses some concrete examples. A think-pair-share

strategy might work well with this worksheet. Give students two or three minutes to read the worksheet and write down any answers they know or guesses they have about the answers. Next, give students three to five minutes to share their ideas with a partner. Finally, ask for responses from the whole class. Record these responses on the overhead. Make an overhead transparency of the blackline master for this purpose.

Check Your Understanding Answers (page 30)

1. Answers will vary. For example: hammer, wood, make-up, orange juice, pens, paper, air. Light and energy are not considered to be matter.
2. 665 g

2.1 Matter Has Mass and Volume (page 31)

SUGGESTED TIMING

45 min over 2–3 classes for the chapter material
10–15 min for What's Going On?
5–60 min for Try This!, page 32, depending on which option you choose
30 min for Try This!, page 33
30 min for Find Out

BLACKLINE MASTERS

Master 2 Safety Precaution Symbols
BLM 2–1 Metric Worksheet
BLM 2–2 Volume and the Overflow Method
OHT 3 Mass or Volume?
OHT 4 States of Matter
Assessment Master 9 Safety Checklist
Assessment Master 10 Safety Rubric
Assessment Master 11 Using Tools and Equipment Checklist
Assessment Master 12 Using Tools and Equipment Rubric

Specific Expectations

SIL1.01 – describe how the procedures, skills, and tools employed in different areas of science are also evident in daily life
SIL2.03 – conduct investigations safely, using appropriate lab equipment
SIL2.04 – observe and record data, using a variety of formats, including the use of SI units, where appropriate
SIL2.05 – assess data to make inferences and conclusions and to answer questions and refine procedures
CPM1.04 – describe the physical properties of common materials, using appropriate scientific terminology
CPM2.01 – plan and conduct investigations on the physical and chemical properties of substances, using lab equipment and materials safely and accurately
CPM2.02 – use appropriate laboratory safety and disposal procedures while conducting investigations
CPM2.03 – organize and record the observations of the investigations, using appropriate formats

Science Background

Mass remains the same no matter where it is measured, but weight changes according to gravity. If two students who weighed the same went to the Moon, they would still weigh the same as each other (if they stood on two pans of a balance and balanced on Earth, they would also balance on the Moon). However, a bathroom scale would show that each person had only one sixth the mass that they had when they were on Earth, because the Moon's gravity is one sixth that of Earth.

Key Terms Teaching Strategies

Have students complete some or all of the following activities to help them learn and remember the key terms:

- Have students write definitions for these terms in their Science Log. You may wish to have your students keep their own glossary at the back of their Science

Log. Encourage students to write their definitions in full sentences and as concisely as possible.
- Have students write a paragraph that contains the seven key terms in this section.
- Have students develop a visual or series of visuals demonstrating what each of the key terms means.

Reading Icon Answer (page 32)

1. mass — mg, g, kg
volume — cm^3 and m^3, mL, L

Reading Icon Answer (page 36)

1. solid — fixed shape and fixed volume
liquid — shape of its container, fixed volume
gas — shape of its container, volume of its container

Activity Planning Notes

Tie the material in this section as much as possible to students' own concrete experience. They all have some previous knowledge of mass and matter and the volume matter takes up. However, it is important to clear up any misconceptions and misuse of terms relating to these topics.

This section focusses on measurement of mass and volume. Students will have an opportunity to confirm their definition of matter with measurable tools. Use the first two pages as introductory pages. The What's Going On? activity on page 31 is a good place to introduce or refresh experimental skills, such as measuring liquids in a graduated cylinder from the bottom of the meniscus.

You might consider reading pages 31 to 33 as a class first before dividing students into three groups and having two thirds of the students work on page 33 and **BLM 2–1 Metric Worksheet**, if they have not done so earlier, while the others complete the What's Going On? activity. Rotate through the groups, allowing eight to ten minutes for each activity.

You may find **OHT 3 Mass or Volume?** useful to help students learn to distinguish between the two quantities. If a student brings up the issue of the difference between mass and weight, explain the difference.

At the bottom of page 33, density is mentioned. If your class if dealing well with the concepts of mass and volume in this section, you may want to advance to more discussions of density and its applications.

Once students have discussed the difference between mass and volume, have them do the Find Out activity starting on page 34 to help them see the difference concretely. Discuss the section on Mass and Matter at the bottom of page 35, and then review the three states of matter discussed on page 36. Students will likely remember information about this material from their earlier science classes.

Consider using the following blackline master and overhead transparency:

- **BLM 2–1 Metric Worksheet**
- **OHT 3 Mass or Volume?**

Accommodations

- Prompt students who have difficulty staying on task to check off each step of the Find Out procedures as they go. They can also check off steps on **BLM 2–2 Volume and the Overflow Method** as they perform the Try This! on page 33.
- Some students do not understand abstract concepts well and may have difficulty with the illustrations of the three states of matter on page 36. Use three balloons for a kinesthetic lesson. Put air in one, marbles in another, and water in a third. Allow students to handle and squeeze the balloons.

Making Connections Answers (page 33)

2. a) mass: cereal, chicken, grapes, sugar, butter, potato chips, seasoned salt, chocolate, salmon, flour
volume: milk, pop, mayonnaise, vanilla, orange juice, whipping cream, olive oil, sour cream

b) Accept any reasonable answers. For example:
• They have parts or irregular shapes.

c) Accept any reasonable answers. For example:
• They can be poured.

3. 4 m^3 and 6 m^3. Solids have three dimensions.

Making Connections Answer (page 36)

2. solid: fixed shape; fixed volume
liquid: shape of its container; fixed volume
gas: shape of its container; volume of its container

What's Going On? Activity (page 31)

Measure the Mass of a Volume of Water

Purpose

- Students accurately measure the mass of a volume of water.

Science Background

A meniscus forms when the adhesive forces between a liquid and its container are greater than the cohesive forces of the liquid. That means that the water molecules are more strongly attracted to the glass than they are to other water molecules. Therefore the water appears to climb up the walls of the cylinder slightly. The meniscus must be read at eye level when the container is on a flat surface, and the accurate way is to read the bottom (middle) of the meniscus. **BLM 2–2 Volume and the Overflow Method** provides students with an opportunity to practice the skill of reading the meniscus.

Since water has a density of approximately 1 g/mL, students will notice that 50 mL of water has a mass of approximately 50 g.

Accuracy is the closeness of a measurement to the real measurement. Precision is how fine the instrument is. For example, a kitchen scale is much more precise than a bathroom scale because it measures much smaller units.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
1 day before	• Obtain 1 or 2 electronic scales and a class set of graduated cylinders. • Photocopy **BLM 2–2 Volume and the Overflow Method**.

APPARATUS	MATERIALS
• 50 or 100 mL graduated cylinder • electronic scale	• water

Suggested Timing

10–15 min

Safety Precautions

- Have students clean up spills immediately to avoid slipping accidents and to protect books and paper from becoming wet.
- Have students clean up the work area and wash their hands at the end of the activity.

Activity Planning Notes

Discuss the need for accurate measurement in science. You might start this discussion with some examples of events in daily life that do not require a lot of precision or accuracy. In this discussion, some students may offer ideas about things they feel require precision, and other students may disagree. For example, some world class chefs measure all of their ingredients using scales and measuring spoons and cups. Yet some other equally famous chefs may create their masterpieces by measuring "by eyeball," or just casually by hand. As you run the discussion, take the attitude that both sides of the issue are equally valid.

Now lead the discussion to scientific and engineering matters. What happens if a carpenter does not measure boards accurately? How much precision and accuracy is required in that case? Some students may have experience of building things with their parents or other adults and will quickly grasp the concepts of needing a level floor in a house, possible only by measuring accurately. Other students may require a demonstration.

If available, find some blocks from the store room that are almost the same size, but different by a centimetre or so. Build a table by placing a board over two blocks.

If a marble rolls on the table, it is not level (students may discover that the floors in the school are not level while doing this activity!). Ask them about the consequences of slight inaccuracies in various situations.

You might discuss possible consequences of inaccuracy for careers students are considering.

- carpenter— cabinets with inaccurate measurements might not close properly
- plumber — pipes with inaccurate measurements might leak, break, or not fit properly
- fashion designer — custom-made clothes with inaccurate measurements would not fit or look good

Model the appropriate method for taking accurate readings with digital scales and graduated cylinders. Using an electronic balance is fairly simple. Make sure the balance is measuring in grams. Make sure the tare or zero button is pressed each time before you begin weighing.

Accommodations

- Discussion provides an excellent opportunity for confidence building with respect to many students' knowledge of the world. Students probably know more than they think they do about the need for accurate measurements, especially in the trades. Girls interested in fashion may know some stories about badly fitting clothes, or could be led into making some stories up or hypothesizing what would happen if . . . ? Build on students' real-life experiences to make the discussion a rewarding experience for all.

What Did You Learn? Answers (page 31)

5. a) It should be 50 mL, but encourage students to record the exact reading. There are no prizes for getting exactly 50 mL of water, but the reward is getting the same mass and volume of water.

b) The mass in grams should equal the volume in millilitres. Again, encourage accurate recording. If the answers differ, discuss possible sources of equipment or experimental error. If students want to perfect their results, let them re-try the procedure.

c) They should be the same number with different units.

Activity Wrap–up

- Have students complete and then discuss question 5. Check student work for accuracy.

Try This! Activity (page 32)

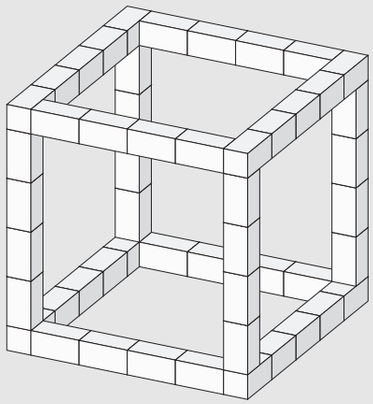
You will need three metre sticks and one or more 1 L or 2 L milk cartons. The 2 L ones are more like 2 dm^3 stacked on top of each other, so they may help students visualize better. As well, the 2 L cartons have perfect measurements for the activities suggested — they are just under 20 cm tall and just under 10 cm wide.

Have one or two students help hold the metre sticks as shown in the student resource to make one cubic metre. Put a milk carton inside to help students visualize the fact that this cube will hold 1000 L.

If you can get ten 2 L cartons, line them up side by side along one side of the cubic metre. Explain that is 20 L, and 50 times that much milk would fit in the cube. If you can only get five cartons, squash or cut off the triangle bits at the top and line them up lying down along one side. That would be 10 L and 100 times more milk will fit in the cubic metre. One litre is one cubic decimetre or 10 cm $\times$ 10 cm $\times$ 10 cm.

If this cube contained 1000 L of water, it would weigh 1000 kg! Ask students if they would be able to lift that. How many students would have to get together to do it? Do they think they could do it if the whole class got together?

If you can fire your students up about it, consider getting them to collect fifty-four 2 L milk cartons and build a display to place in the school lobby or hang from the roof of the classroom. The design for the bottom and top would have five cartons (with triangle tops squashed or cut) lying flat along each length and four cartons fit inside the ends for the width. Then each side is 100 cm. Join the bottom and top at each corner with four cartons, fit on top of the bottom ring and under the corners of the top ring. See diagram on next page.



Create the box using 20 cm pieces of duct tape to connect each carton to its neighbours. If you use masking tape instead, you might want to use 1 m pieces to ensure the whole row stays together.

Try This! Activity (page 33)

Purpose

- Students measure the volume of irregularly shaped objects.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
1 day before	• Obtain a golf ball. • Set up overflow apparatus. • Obtain small objects for students to test (preferably items that sink in water).
Day of	• Photocopy **BLM 2–2 Volume and the Overflow Method**.

APPARATUS	MATERIALS
• 100 mL beaker (or an overflow can) • larger beaker (e.g., 1 L) • graduated cylinder • scales	• small solid objects that fit inside the 100 mL beaker or overflow can • water

Suggested Timing

30 min

Safety Precautions

- Have students clean up spills.
- Remind students to be careful with glass. Point out the container for broken glass, and remind them to inform you about any broken glass.
- Have students clean up the work area and wash their hands at the end of the activity. Though no toxic chemicals were introduced in this activity, explain that they can never be sure what chemicals were used with the equipment the last time it was used, so it is always important to wash hands.

Activity Planning Notes

Make sure the graduated cylinder is large enough to collect all of the displaced water. If it is not, then lead students through how to measure one cylinder-full at a time and still get accurate results, step by step.

The students should carefully lower each object into the overflow can to avoid splashing. However, if the object floats, then modify the method to make it submerge. Push the object down with a pin or nail, until it is just below the surface of the water.

Use **BLM 2–2 Volume and the Overflow Method** to help walk students through the procedure. Demonstrate the overflow method with a golf ball or other object.

Have students choose a solid, predict its mass, weigh the item, and record the data. Have students find the volume of their solid using the overflow method.

Introduce the concept of density. The definition of density is not required; explain the relationship of density to sinking or floating.

Accommodations

- Make a data table on the chalkboard and fill it in as you work through the golf ball exercise together.
- Students with dexterity problems could try an easier version of this activity. Use a large graduated cylinder and a smaller object. Record an initial volume of water. Add the object. Record the final volume of water. The volume of the object is the difference in the two volumes.

Activity Wrap-up

- Have students compare the mass, volume, and density of their object with that of other students.

Find Out Activity (page 34)

Compare Mass and Volume

Purpose

- Students measure the volumes of two different objects with the same mass.

Science Background

Different items with the same mass do not necessarily have the same volume. The relationship between mass and volume is called density. Any objects less dense than water (approximately 1 g/mL) will float.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
1 day before	• Gather the required materials.
Day of	• Photocopy **Master 2 Safety Precaution Symbols**, and any assessment masters you decide to use.

APPARATUS	MATERIALS
• electronic scale, equal-arm balance, or triple beam balance • containers suitable to hold 500 g of each material	• at least 500 g of assorted materials (e.g., feathers, pebbles, sand, popcorn)

Suggested Timing

30 min

Safety Precautions

- Make sure that the procedures students plan are safe. Remind students to set up their equipment so that objects don't fall on the floor.
- Set up lab groups far enough apart to avoid dropped objects due to overcrowding.
- Have students clean up the work area and wash their hands at the end of the activity.

Activity Planning Notes

Before starting, have students consider what safety precautions might be needed. They can cut out the

safety symbols from **Master 2 Safety Precaution Symbols** and glue the appropriate ones directly into their student resource. For this activity, students might need to use the Clothing Protection and Eye Safety symbols. Discuss as a class what other safety precautions students need to take and make sure they record them in question 1.

Consider providing students with **Assessment Master 9 Safety Checklist** and **Assessment Master 11 Using Tools and Equipment Checklist** to help them.

Check students' procedures before they begin. If students choose objects that float, then the water displacement method needs to be modified to make it submerge. Have students use a pin or nail to push the object until it is just below the surface of water. Remember that lighter objects are required in a greater quantity.

Accommodations

- Students with dexterity problems could use a graduated cylinder, which is a simpler way to measure volume than the overflow method described on page 31. To do this, fill a cylinder to 30 mL, drop an object in, and check the rise in the water level to find the volume of the object.
- If you have keen students, you could have them try both methods and debate their merits.

Activity Wrap-up

- Have students complete and discuss questions 8 and 9. Check student work for completion.
- Pose the following discussion question: A 500 g block of wood floats in 500 g of water. What can you conclude about the volume that both objects occupy? Which object is bigger?

Ongoing Assessment

- At this early stage of the course, the objective of assessment should be more focussed on improvement and development than grading. Try to encourage students to develop their own notes about their progress and how they feel they can improve. Journal-like entries may increase their self-awareness.
- Although this Teachers' Resource has an associated set of assessment masters, take an opportunity in this early section to develop a checklist or rubric with the class. Seek active input about which categories should be included, and which skills assessed.
- Consider using the following assessment masters to assess students during the Find Out activity:
  - **Assessment Master 10 Safety Rubric**
  - **Assessment Master 12 Using Tools and Equipment Rubric**

Technology Links

- For an on-line tutorial about mass and volume, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Mass and Volume.

Alternative Activities

- Show a video such as *Phases of Matter*, Bill Nye, The Science Guy (Magic Lantern Communication Ltd.). Bill Nye takes viewers on a tour of a steel mill to demonstrate that matter exists in three states.
- Use some or all of the activities in the following Chemistry *ActiveFolders*: Measurement.

2.2 Properties Define Matter (page 37)

SUGGESTED TIMING

30 min for reading and discussing
30 min for Find Out

MATERIALS

- object (students make observations about its physical and chemical properties)

BLACKLINE MASTERS

BLM 2–3 Making Different Types of Observations
Assessment Master 1 Co-operative Group Work Checklist
Assessment Master 2 Co-operative Group Work Rubric

Specific Expectations

SIL2.03 – conduct investigations safely, using appropriate lab equipment
SIL2.04 – observe and record data, using a variety of formats, including the use of SI units, where appropriate
CPM1.03 – explain the characteristics of pure substances and mixtures, using appropriate scientific terminology
CPM1.04 – describe the physical properties of common materials, using appropriate scientific terminology
CPM1.05 – describe the chemical properties of common materials, using appropriate scientific terminology
CPM2.01 – plan and conduct investigations on the physical and chemical properties of substances, using lab equipment and materials safely and accurately
CPM2.02 – use appropriate laboratory safety and disposal procedures while conducting investigations
CPM2.03 – organize and record the observations of the investigations, using appropriate formats
CPM2.04 – interpret and communicate the results of investigations
CPM3.01 – investigate the physical and chemical properties of the component materials of two similar products

Key Terms Teaching Strategies

Have students complete some or all of the following activities to help them learn and remember the key terms:

- Have students write a paragraph that contains the seven key terms in this section.
- Have students choose an item, and then provide examples of each of the types of properties for that item.

Reading Icon Answer (page 39)

9. Students should highlight: see a car's oil level; hear how the engine is running; smell what is happening in the engine compartment.

Reading Icon Answer (page 40)

1. Look for the idea that qualitative observations do not tell how much of a property something has. For example, someone might say that a piece of steel is strong, but is it strong enough to hold up a car or only a wooden block?

Activity Planning Notes

Read page 37 with the class, then show students an interesting object. Try to use an object that is large enough for the whole class to see easily. Talk about the physical and chemical properties of the object.

Look at the chart on page 37. Have students think of an object for each property listed.

Accommodations

- Engage students by linking the information in this section with their own experiences. All students have experience of the four types of properties.
- For students who struggle with vocabulary, work in reverse. Instead of asking them to name a physical property, brainstorm properties. Then, work as a group to categorize the properties as chemical or physical, qualitative or quantitative.
- Remind students of the similarity between the words "quantity" and "quantitative." Such properties use a number. "Qualitative properties" are about the "qualities" or characteristics of materials.

Have students do the Find Out activity on page 38. After, work on pages 39 and 40 together as a class. Encourage students to relate their experiences with properties of matter. Hair salons and kitchens should provide plenty of discussion of chemical properties. For example, chefs must carefully observe the qualitative properties of their products and even make quantitative observations of temperature as they cook.

For homework, consider having students write a paragraph about chemical, physical, qualitative, and quantitative properties in a home or work environment. First, have students write a paragraph including at least five observations and bring it to class. Next, use a think-pair-share strategy. Have students read their paragraphs aloud, then help each other to classify each observation as referring to chemical, physical, qualitative, and quantitative properties.

Consider using the following blackline master:
- **BLM 2–3 Making Different Types of Observations**

Check Your Understanding Answer (page 37)

1. Physical properties describe something without causing it to react. Examples include shape, colour, and smell.
Chemical properties describe how something reacts with other substances. Examples include how it reacts with other substances, and how easily it burns or catches fire.

Making Connections Answer (page 39)

10. Wording will vary. For example:
Do not taste things because they could be contaminated with other poisons from the science lab.

Making Connections Answers (page 40)

2. a) qualitative; no measurement

b) quantitative; an exact temperature

c) quantitative; an exact mass

d) qualitative; no measurement

Find Out Activity (page 38)

Observing Without Seeing

Purpose

- Students examine and record physical properties of an object without using the sense of sight.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
Several days before	• Gather the mystery substances.
1 day before	• Put the mystery substances in containers. Label the containers with numbers and record their contents. • Photocopy the assessment masters.

APPARATUS	MATERIALS
• plastic jars with lids (6 per group) • blindfold per group	• assorted substances with different properties, smells, and textures (e.g., marshmallows, nails, tennis balls, ping pong balls, walnuts in shells, peppermints, citrus peel, licorice candies)

Suggested Timing

30 min

Safety Precautions

- Find out if any students have allergies to aromatic substances. If there are allergies, avoid choosing the trigger substances.
- Remind students not to eat anything in the lab. You might avoid using edible objects.
- Have students clean up the work area and wash their hands after using sticky substances and at the end of the activity.

Activity Planning Notes

Consider using aromatic substances such as wrapped pieces of cheese, peppermints, lemons or lemon peel, or aromatic herbs such as lavender. Consider preparing sets of jars and blindfold as lab kits for each group so that obtaining and returning materials may be less chaotic. Make each lab group responsible for returning the lab kit they signed out.

Keep an eye on the class during the activity to make sure the situation with the blindfolds remains scientific and respectful.

Accommodations

- If students are fearful or lack trust, consider using opaque containers instead of blindfolds.

What Did You Discover? Answers (page 39)

7. Touch, smell. Students should not say taste.

8. Answers will vary. Encourage students to provide detailed responses.

Activity Wrap-up

- Have students complete and discuss questions 7 and 8.
- In a class discussion, address the following questions:
  - Did each of your senses give you the same kind of information?
  - How does a blind person learn what something looks like? How does a deaf person learn how things sound?
    Consider having students feel text in a Braille book to help them understand how a blind person reads using the sense of touch. Or, have students feel a vibrating stereo speaker to help understand how a deaf person uses the sense of touch to feel the sound of music.
- Have students use **Assessment Master 1 Co-operative Group Work Checklist** to assess their group work skills.

Ongoing Assessment

- Have students write a journal entry about the observations they made during the Find Out activity. Ask them to think of at least two ways that they could have provided more details.
- Consider using **Assessment Master 2 Co-operative Group Work Rubric** to assess students' ability to work in groups.
- Use the Making Connections question on page 40 to assess how well students understand qualitative and quantitative properties.

Technology Links

- To examine the microscopic structure of the three states of matter, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Three States of Matter.

2.3 Physical Properties of Matter

(page 41)

SUGGESTED TIMING

35–40 min for reading and discussing
40–45 min for Find Out
30 min planning and 30 min doing (if desired) for Try This!

BLACKLINE MASTERS

Master 2 Safety Precaution Symbols
OHT A–7 Thermometer
Assessment Master 3 Lab Report Checklist
Assessment Master 4 Lab Report Rubric
Assessment Master 12 Using Tools and Equipment Rubric

Specific Expectations

SIL2.02 – plan, conduct, and refine simple investigations to answer student-generated questions
SIL2.03 – conduct investigations safely, using appropriate lab equipment
SIL2.04 – observe and record data, using a variety of formats, including the use of SI units, where appropriate
SIL2.05 – assess data to make inferences and conclusions and to answer questions and refine procedures
CPM1.04 – describe the physical properties of common materials, using appropriate scientific terminology
CPM2.01 – plan and conduct investigations on the physical and chemical properties of substances, using lab equipment and materials safely and accurately
CPM2.02 – use appropriate laboratory safety and disposal procedures while conducting investigations
CPM2.03 – organize and record the observations of the investigations, using appropriate formats
CPM3.01 – investigate the physical and chemical properties of the component materials of two similar products

Key Terms Teaching Strategies

Have students complete some or all of the following activities to help them learn and remember the key terms:

- Have students write definitions for these terms in their Science Log. You may wish to have your students keep their own glossary at the back of their Science Log.
- Have students write a paragraph that contains the six key terms in this section.
- For the key terms that describe physical properties, have students draw or cut out pictures from magazines that show materials with high and low conductivity, elasticity, strength, and viscosity. They can then develop sentences similar to those on page 44 to help them remember the terms.

Reading Icon Answers (page 41)

1. a) Students should circle 100ºC.

b) Students should highlight 0ºC.

Reading Icon Answer (page 44)

1. Look for an example of a product for each property and an explanation. For example:

- Conductivity
  – Electric wires need high conductivity so electricity can move quickly.
  – Insulation needs low conductivity to help stop heat from escaping from a house.
- Strength
  – Steel cables need a lot of strength because they hold up structures like bridges.

– Fuses need little strength because they need to break if too much electricity goes through them or if they get hot.

• Elasticity
– Baseballs need a lot of elasticity to bounce.
– Modelling clay needs little elasticity so it can be pushed and pulled into different shapes without bouncing back.

Activity Planning Notes

Begin the lesson by asking students to describe the physical properties of a pencil. From the previous section, students should be able to describe properties that are qualitative (e.g., cylindrical, yellow, solid) and quantitative (e.g., specifics about length, mass, diameter).

The boiling point and freezing point of water are important quantitative properties for students to remember. Have students label the boiling point and freezing point on the thermometer.

The Try This! activity on page 41 is similar to a Test It! that starts on page 71 in Chapter 3. Students can do the activity now and develop their own investigation, or wait until Chapter 3, where the student resource scaffolds the development of the investigation. Since this is an important investigation, it is important for students to do it either here or in Chapter 3.

If you decide to have students do the Try This! now, unless it's a deep Canadian winter day, bringing the temperature low enough to reach the freezing point is often difficult without the proper equipment. If the weather is too warm, consider having students develop an investigation for freezing point and boiling point, but carry out only the investigation for determining boiling point.

After students do the Find Out activity on page 42, as a class read page 43. This is a great example of how viscosity is important in everyday life. Use page 44 as an opportunity for students to study some physical properties and make inferences about their functions.

Consider using the following overhead transparency:
• **OHT A–7 Thermometer**

Accommodations

• Find out what other courses student are taking and use materials from those courses when you discuss physical properties. For example, if many students are taking an automotive shop, discuss the physical properties of different oils and engine materials. Students who are taking a cooking course might discuss the properties of cooking utensils or ingredients they are using. Students in cosmetology may discuss the properties of shampoos, conditioners, and hair dyes.

Making Connections Answer (page 41)

2. quantitative. It has a number so it's an exact measurement.

Making Connections Answers (page 43)

11. a) 5W–40 is a likely answer.

b) Winter oil is thinner than 10W–40, which is a common summer oil.

Find Out Activity (page 42)

Which Liquids Have High Viscosity?

Purpose

- Students compare the viscosity of water, corn syrup, and a liquid of their choice.

Science Background

"Fluid" is a word that is applied to anything that flows. Gases may also be fluids, though they are not liquids. Gases have low viscosity so flow easily and quickly. Extremely high viscosity fluids such as glacier ice and window glass may flow only fractions of a millimetre per year.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
2 to 3 days before	• Have students brainstorm a list of common household chemicals, and then make choices from this list. • Obtain household chemicals. Consider asking students to bring in any liquids they want to test. • Ensure that bottles are clean and labels are intact.
1 day before	• If using, photocopy **Master 2 Safety Precaution Symbol**s, and any assessment masters you decided to use.

APPARATUS	MATERIALS
Each lab group requires: • support stand and ring • 3 foam cups • 2 – 50 mL graduated cylinders • sharpened pencil • stopwatch	• water • 15 mL of corn syrup per group • variety of liquids with different viscosities

Suggested Timing

40–45 min

Safety Precautions

- Set up lab groups far enough apart to avoid accidents due to overcrowding.
- Have students clean up the work area and wash their hands at the end of the activity.

Activity Planning Notes

In advance, consider making up a lab kit for each group that contains the required apparatus and materials.

Explain viscosity in terms of flow rate of a liquid. Here is a helpful way to remember high and low viscosity:
High viscosity = **H**ard to pour
Low viscosity = **L**iquid

Discuss various common liquids to gauge the familiarity that students have with this concept. Low viscosity liquids include molasses, tar, and some glues. You may wish to compare and contrast viscosity by discussing the increase of viscosity in glue as it dries. Students will see that more viscous materials have less water. Water itself is considered a low viscosity fluid.

Discuss appropriate safety precautions. For this activity, students might need to use the Clothing Protection symbol. They might write a sentence about cleaning up any spilled fluids immediately to prevent slipping accidents. Decide as a class what other safety precautions students need to take and make sure they record them before continuing.

Cleaning oily containers can be a problem. If you decide to use such liquids, students should not empty materials down the sink. Provide a 4 L bucket to empty oils and any other materials that are not water soluble.

Students will have some options in choosing their final liquid to be tested. You may wish to limit students' choices by providing about five different liquids (e.g., baby oil, molasses, pop, shampoo, honey, milk, juice, liquid soap).

Accommodations

- Students can cut out the safety symbols from **Master 2 Safety Precaution Symbols** and glue them into their student resource.

Activity Wrap-up

- Have students complete and discuss questions 9 and 10.
- Discuss everyday applications related to viscosity of liquids. For example, discuss the viscosities of foodstuffs such as pancake batter and sugared icing. Or, discuss how the temperature of engine oil dictates how quickly it will drain from an engine during an oil change. This discussion leads into the Making Connections question on page 43.

What Did You Observe? Answer (page 42)

8. Data tables will vary. For example:

Liquid	Time	Observations about Liquid
corn syrup		
water		
corn oil		

What Did You Discover? Answers (page 43)

9. Answers will vary depending on the liquids chosen. For example: corn syrup, corn oil, water.

10. Look for the idea that the liquid with the highest viscosity flows the slowest. Corn syrup has a higher viscosity than most other liquids.

Alternative Activities

- Have students interview a mechanic to find out how they deal with the viscosity of oils at different temperatures.
- Have students create a poster showing several liquids that serve different purposes because of their different viscosities. Some examples are engine oils, maple syrup, and ketchup. Students might develop an investigation to test the viscosities of liquids.
- Use some or all the activities in the following Chemistry *ActiveFolders*: Chemical and Physical Changes, and States of Matter.
- Use some or all the activities in the following Physics *ActiveFolders*: Electricity.

Ongoing Assessment

- Interview students during the Find Out activity to ascertain if they understand the concept of viscosity.
- You may wish to have students prepare a lab report on the viscosity of liquids. Provide students with **Assessment Master 3 Lab Report Checklist**. Use **Assessment Master 4 Lab Report Rubric** to assess the quality of student reports.
- Consider using **Assessment Master 12 Using Tools and Equipment Rubric** to assess students' use of equipment.

Technology Links

- For more information on fireworks, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Fireworks.
- For more information about viscosity, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Viscosity.

2.4 Chemical Properties of Matter

(page 45)

SUGGESTED TIMING

15 min for reading and discussing
60 min for Test It!
60 min for Find Out
30 min for Science and Literacy Link

BLACKLINE MASTERS

BLM 2–4 Slime Tests
BLM 2–5 Chapter 2 Word Puzzle
OHT 1 HHPS Symbols
OHT A–8 to A–9 Test It! What Labels Belong Where?
Assessment Master 7 Scientific Communication Checklist
Assessment Master 8 Scientific Communication Rubric
Assessment Master 9 Safety Checklist
Assessment Master 10 Safety Rubric
Assessment Master 12 Using Tools and Equipment Rubric

Specific Expectations

SIL2.01 – formulate questions about problems or issues that can be scientifically tested
SIL2.02 – plan, conduct, and refine simple investigations to answer student-generated questions
SIL2.03 – conduct investigations safely, using appropriate lab equipment
SIL2.04 – observe and record data, using a variety of formats, including the use of SI units, where appropriate
SIL2.05 – assess data to make inferences and conclusions and to answer questions and refine procedures
SIL2.06 – communicate plans, observations, and results using a variety of oral, written, and graphic representations, and including the use of SI units, where appropriate
CPM1.05 – describe the chemical properties of common materials, using appropriate scientific terminology
CPM2.01 – plan and conduct investigations on the physical and chemical properties of substances, using lab equipment and materials safely and accurately
CPM2.02 – use appropriate laboratory safety and disposal procedures while conducting investigations
CPM2.03 – organize and record the observations of the investigations, using appropriate formats
CPM2.04 – interpret and communicate the results of investigations

Key Terms Teaching Strategies

Have students add the definition for chemical change to their Science Log.

Reading Icon Answer (page 45)

1. Students should highlight each item in the column under Evidence of Chemical Change on the table. Students should circle an example of each chemical change in the column under Example.

Reading Icon Answers (page 50)

1. Students should highlight physical properties such as: wrapped in paper; powders are black, yellow, and white; fuse made of string; sparklers dipped in a binding agent.
2. Students should circle chemical properties such as: produce colourful explosions; produce noise; sparklers burn slowly.

Activity Planning Notes

The chemical properties of a substance determine how it will behave during a chemical reaction. The chapter begins with examples of chemical changes, and evidences of change. These clues will be useful to know when completing this section's investigations.

Many household items have chemical properties that are dangerous and harmful. This is an opportune time to review WHMIS, HHPS, and MSDS, and their importance.

Proceed to the Test It! investigation. This is an opportunity for students to test the properties of certain substances to identity them.

Once students have completed the Test It!, proceed to the Find Out activity on page 48. Complete it and then discuss the Science and Literacy Link on page 50. Discuss with students how chemistry is important to many things that they enjoy in life.

Consider having students complete **BLM 2–5 Chapter 2 Word Puzzle** to reinforce vocabulary words.

Consider using the following blackline master and overhead transparency:
- **BLM 2–5 Chapter 2 Word Puzzle**
- **OHT 1 HHPS Symbols**

Making Connections Answer (page 45)

2. Answers will vary. For example:
- explosion. The explosion produced light.

Check Your Understanding Answers (page 51)

3. Answers will vary. For example:

a) firecrackers: powders are black, yellow, and white; explodes loudly

b) sparklers: are put together with binding agents; explodes colourfully, burns more slowly than firecrackers

c) fireworks: powders are black, yellow, and white; explodes loudly and colourfully

4. a) Students should circle: First, When, Then, When, Finally.

b) First, the firework is loaded into a short steel pipe.
When it is lit, the powder explodes and shoots the firework up into the air.
Then, the fuse on the firework gets lit when the powder explodes.
When the fuse reaches the end, it lights the bursting charge, and the firework explodes.
Finally, the explosion causes the material to shoot showers of sparks.

Test It! Activity (page 46)

What Labels Belong Where?

Purpose

- Students identify four unknown substances based on their chemical and physical properties.

Science Background

The four mystery powders in this activity have different physical properties, even though they are all white. Also, they have different chemical properties. The following changes and reactions can be expected in this activity:

- Baking soda fizzes with vinegar (chemical change).
- Starch turns black with iodine (chemical change).
- Iodine changes powders to its own colour, but not a new one (physical change).
- Sodium chloride has square-sided crystals (physical property). This property can be used to distinguish between salt and glucose.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
1 day before	• Obtain required equipment and materials. • Prepare the 4 powders labelled 1, 2, 3, 4. • Fill dropper bottles with a testing liquid (vinegar and dilute iodine solution). • Photocopy any assessment masters you decide to use.

APPARATUS	MATERIALS
Each lab group requires: • scoopula • magnifying lens • spot plate • 2 dropper bottles	• 4 containers each containing one of the following powders: starch, baking soda, sodium chloride, glucose • vinegar • iodine • toothpicks

Suggested Timing

60 min

Safety Precautions 

- Remind students to be careful with glass. Point out the container for broken glass, and remind them to inform you about any broken glass.
- Remind students not to eat anything in the science lab.
- Tell students that iodine will stain their clothes and their skin. Care must be taken to avoid any accidents.
- Have students clean up the work area and wash their hands at the end of the activity.

Activity Planning Notes

Consider making up a lab kit of the exact equipment requirements for each lab group. Have students be responsible to return the exact amount of equipment in their lab kit.

Allow students an opportunity to develop their own steps to complete the investigation. You may wish to use **OHT A–8** and **A–9 Test It! What Labels Belong Where?** to help you coach students through developing this investigation. Check their planning before allowing them to begin the investigation.

Have students test only one powder at a time. They can place a small amount of powder in each of the four spots on the spot plate and then use toothpicks to mix the iodine and vinegar (separately) with the powders.

Accommodations

- Invite students who are likely to cause problems in the lab to watch you demonstrate the procedure instead of letting them do it themselves.

Test It! Answers (pages 46–47)

1. Which substance reacts with vinegar?

2. Which substance turns bluish-black when iodine is added?

3. Which substance has square-sided crystals?

4. Wording may vary.
- If a substance bubbles when it reacts with vinegar, I will know it is baking soda.
- If a substance turns bluish-black with iodine, I will know it is starch.
- If I see cubic crystals in a substance, I will know it is sodium chloride.
- The last substance must be glucose.

5. The magnifying lens helps to see the shape of the crystals.

6. I can drop it onto each powder in the spot plate and see if it reacts.

7. I can drop it onto each powder in the spot plate and see if it reacts.

8. Data tables will vary. For example:

	Shape of Crystals	Reaction with Vinegar	Reaction with Iodine
Powder 1			
Powder 2			
Powder 3			
Powder 4			

9. Encourage students to provide a logical explanation of their reasoning.

10. **a)** crystal shape

b) reaction of baking soda and vinegar

Activity Wrap-up

- Consider providing students with **Assessment Master 7 Scientific Communication Checklist** to guide them in completing their write-up.
- Have students complete and discuss questions 9 and 10 on page 47. Have students share observations of physical properties and chemical properties from their own experiences.
- You might set up the activities below as a quiz to assess how well students understand the concepts in the Test It! investigation.
  - Show sugar and coloured drink crystals. Instruct them to describe the physical properties they observe. Mix the two. Ask them to identify and then justify whether a physical or chemical change has occurred.
  - Show vinegar and baking soda. Instruct them to describe the physical properties. Mix the two. Ask them to identify and then justify whether a physical or chemical change has occurred.

Find Out Activity (page 48)

What Are the Properties of Slime?

Purpose

- Students test the physical properties of a substance known as slime.

Science Background

Slime has many interesting physical properties to investigate because it is a non-Newtonian fluid. This mean that it does not fit into Newton's laws of how true liquids behave — specifically, that its viscosity increases as increasing force is applied to it. Quicksand, slime, gelatin, and many pastes and glues are non-Newtonian fluids. If you act on them with a small amount of force, such as stirring them slowly or letting your fingers slowly sink into them, they won't offer as much resistance as they would if a greater force, such as a quick, firm poke, acts on them.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
1 day before	• Prepare the glue and borax solutions. Glue: Mix equal quantities of glue and water. Borax: Prepare a borax solution with 5 mL of borax in 250 mL of water. • Photocopy **BLM 2–4 Slime Tests**, and any assessment masters you decide to use.

APPARATUS	MATERIALS
Each lab group requires: • 50 mL graduated cylinder • 250 mL beakers • medicine dropper	• stir stick • plastic bag • glue (Elmer's works best) • borax dissolved in water • green food colouring

Suggested Timing

60 min

Safety Precautions

- Remind students to be careful with glass. Point out the container for broken glass, and remind them to inform you about any broken glass.
- Tell students that there is a "No slime on carpets, clothing, or other people" rule.
- Emphasize that slime should not be disposed of in the sink.
- Have students clean up the work area and wash their hands at the end of the activity.

Activity Planning Notes

Try the slime recipe before the lab. You may need to add more borax solution to get the mixture to gel. Note that it is crucial to have all the borax dissolved before mixing or there will be grits in the product, and the product will be less malleable.

You might have students review **Assessment Master 9 Safety Checklis**t to help emphasize proper handling and disposal of slime before they start making slime.

The best way to clean slime off hands, cups, and plates is by using a dry paper towel. Students should wash their hands only after they remove the slime residue from them.

You may photocopy **BLM 2–4 Slime Tests** to guide students in their observations, or you could make an overhead transparency of the blackline master, and have students choose four of the tests to record in the chart on page 48.

What Did You Observe? Answers (page 49)

9. Wording will vary. For example:
- White substance: sticky, bright white; can be pulled in long strings if the stir stick is lifted up
- Green substance: intense green colour; stains hands

- Clear substance: seems like water, but it is not; doesn't smell; not allowed to taste it
- New substance: green and gooey

What Did You Discover? Answers (page 49)

10. Accept all reasonable responses. For example:
- It is stretchy and oozy, but breaks if pulled apart too fast.

11. Accept all reasonable responses. For example:
- Vary the amount of materials to get a firmer or oozier substance.

Activity Wrap-up

- Have students complete and then discuss questions 10 and 11. Challenge them to think about practical applications of the properties of the new substance.
- You might ask the following questions:
  – How does the testing you did compare with tests that engineers might do?
  – Do you think that engineers always know the practical uses of a substance before they test it?
- If you decide to let students take home their slime, have them stop by at the end of the day to pick it up. Remind them that the same cleaning strategies they used in the lab for the slime will apply at home.

Alternative Activities

- Show a video such as *Chemical Reactions*, Bill Nye, The Science Guy (Magic Lantern Communication Ltd.). Available from Distribution Access at **www.distributionaccess.com**. Bill Nye explains that everything is made of chemicals and uses several explosions and a "tornado of fire" to illustrate his point!
- Use some or all of the activities in the following Chemistry *ActiveFolders*: Chemical and Physical Changes, and Chemical Reactions.

Ongoing Assessment

- Assess student work habits and behaviour in the laboratory. Circulate and praise students who are doing well. Quietly correct students who are making errors.
- You may wish to evaluate students and lab groups based on the following factors:
  – knowledge of the scientific method
  – data that students recorded
  – groups who share the work evenly
  – students who stay on task
  – students who follow the safety procedures
  – accuracy of the group's analysis
- Consider using **Assessment Master 8 Scientific Communication Rubric** to assess the quality of student work in the Test It! investigation.
- Consider using the following assessment masters to assess student work in the Find Out activity:
  – **Assessment Master 8 Scientific Communication Rubric**
  – **Assessment Master 10 Safety Rubric**
  – **Assessment Master 12 Using Tools and Equipment Rubric**

Technology Links

- For a solvable crime using mystery powders, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Mystery Powders.
- For more information on the chemistry of fireworks, go to **www.mcgrawhill.ca/books/Se9** and follow the links to Fireworks.

Chapter 2 Review (page 52)

SUGGESTED TIMING

60 min to complete and take-up the review, and then assign the Practice Test

BLACKLINE MASTERS

Master 3 Certificate
Master 4 List of Skills
BLM 2–5 Chapter 2 Word Puzzle
BLM 2–6 Chapter 2 Practice Test
BLM 2–7 Chapter 2 Test

Accommodations

- Allow students to make a chapter summary page of the key ideas/skills from the chapter. The back of the student resource provides space to do this. Alternatively, you might develop a chapter summary as an entire class.
- If students have difficulty with a particular review question, use the Review Guide to identify the section they need to review.
- **BLM 2–6 Chapter 2 Practice Test** can be customized to produce extra reinforcement questions.

Using the Chapter Review

Depending on your class, students should be able to work through the review at their own pace. In order to have success with the Chapter Review, some students may need to do it in chunks, by completing several questions and then taking them up before continuing. This process will prevent students from completing many questions incorrectly.

To provide additional reinforcement of key terms, have students complete **BLM 2–5 Chapter 2 Word Puzzle**. Once the review is completed and taken up, assign **BLM 2–6 Chapter 2 Practice Test** for students to answer individually. They may wish to use their completed review to help them.

Review Guide

Question	Section(s)	Refer to
1	chapter opener	Describing Matter (page 30)
2	2.1	The Three States of Matter (page 36)
3	2.2	Making Observations (page 39)
4	2.2	Quantitative Properties (page 40)
5	2.2	Properties Define Matter (page 37)
6	chapter opener	Describing Matter (page 30)
7	2.1	Matter Has Mass and Volume (page 31)
8	2.2	Quantitative Properties (page 40)
9	2.2	Properties Define Matter (page 37)
10	2.1	What's Going On? (page 31) and Measuring Matter (page 32)
11	2.4	How Fireworks Work (page 50)
12	2.2, 2.3, 2.4	Properties Define Matter (page 37); Physical Properties We Use (page 44); Chemical Properties of Matter (page 45)
13	2.1	Measuring Matter (page 32)

Chapter 2 Review Answers (pages 52–53)

1. **g)** matter

2. **h)** states of matter

3. **d)** qualitative property

4. **e)** quantitative property

5. **a)** chemical property

6. **b)** mass

7. **c)** volume

8. **f)** 100ºC

9. **c)** physical properties

10. Space it takes = volume; Amount of it = mass
Measure it with a graduated cylinder; Measure it with a scale
Units of measurement = m^3, cm^3; Units of measurement = mg, g, kg

11. Answers will vary. For example:

a) explosive; chemical

b) colourful; physical

c) solid; physical

12. Answers will vary. For example:
- A school bus is yellow; has green seats inside; the engine makes explosions with gas; and it smells like stinky sneakers.

13. **a)** F. Volume can be measured in other ways such as the volume displacement method.

b) F. These units describe volume.

c) T

d) T

Summative Assessment

- Have students complete **BLM 2–7 Chapter 2 Test** to assess individual skills.
- You may wish to develop **Master 3 Certificate** to show students what they have learned during this chapter. Cut and paste the related skills from **Master 4 List of Skills**.