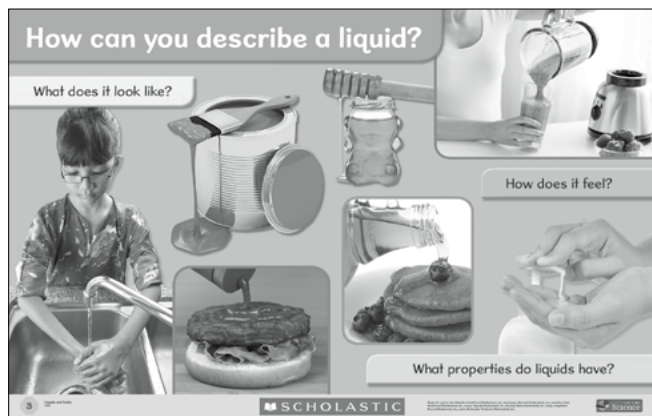


# How Can We Describe Liquids?



**Focus:** Students explore and describe various liquids, then sequence liquids according to a variety of properties.

## Specific Curriculum Outcomes

**Students will be expected to:**

- 23.0 explore properties of familiar liquids and solids [GCO 1/3]
- 12.0 communicate while exploring and investigating [GCO 2]
- 10.0 sequence or group materials and objects [GCO 2]

## Performance Indicators

**Students who achieve these outcomes will be able to:**

- describe a liquid using words related to its properties
- sequence liquids according to a variety of properties

## NOTES:

## Attitude Outcome Statements

### Encourage students to:

- willingly observe, question, and explore [GCO 4]

## Cross-Curricular Connections

### English Language Arts

#### Students will be expected to:

- speak and listen to explore, extend, clarify, and reflect on their thoughts, ideas, feelings, and experiences [GCO 1]

## Getting Organized

| Components                                                                                                                                                      | Materials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Before You Begin                                                                                                                                                                                                                                      | Vocabulary                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• IWB Activity 5</li> <li>• BLM <i>Sequencing Liquids</i></li> <li>• Science Card 3</li> <li>• Science Card 4</li> </ul> | <ul style="list-style-type: none"> <li>• several clear plastic containers of various shapes and sizes</li> <li>• 250–500 ml of coloured water</li> <li>• clear mug, shallow foam tray, and small baggie</li> <li>• Properties of Solids Anchor Chart</li> <li>• small clear plastic cups, such as medicine cups</li> <li>• 250 ml each of several liquids (e.g., glue, milk, vinegar, juice, cooking oil, chocolate sauce, hand lotion, shampoo) in clear plastic cups</li> <li>• various containers (e.g., mugs, bowls, test tubes, square pans)</li> <li>• students' Science Journals</li> <li>• 3 clear containers of same size and shape, containing 100 ml of apple juice, hair conditioner, and molasses (separately)</li> <li>• sticky notes</li> <li>• students' Science Folders</li> <li>• a variety of liquids (e.g., bottle of glue, litre of milk, bottle of vinegar, bottle of cooking oil, bottle of chocolate sauce, hand lotion in dispenser or bottle, bottle of shampoo, bottle of water, hand soap in dispenser, jar of honey, bottle of ketchup, container of maple syrup)</li> <li>• ml measuring spoons</li> <li>• one large piece of stiff cardboard for every 3–4 students; one side should be covered with parchment paper</li> <li>• several foil pans</li> </ul> | <ul style="list-style-type: none"> <li>• Display the Properties of Solids Anchor Chart from <i>How Can We Describe Solids?</i> (see pages 18–23).</li> <li>• Set out the clear plastic containers, the coloured water, and the ball/block.</li> </ul> | <ul style="list-style-type: none"> <li>• behave</li> <li>• behaviour</li> <li>• flow</li> <li>• swirl</li> <li>• sequence</li> <li>• viscous</li> <li>• viscosity</li> <li>• colourless</li> <li>• transparent</li> <li>• transparency</li> </ul> |

## Safety

- Ensure students are not allergic to any substances being tested.
- Remind students not to taste any of the substances they are investigating.

## Science Background

- Students may observe that some solids actually “pour” or “flow” in the same way as liquids do (e.g., salt pouring from a box, sand flowing from a bucket). A collection of many small particles of solid materials (such as sand) can pour like liquids but each individual particle maintains its shape.
- In addition to the physical properties of colour, odour, and taste, liquids also have differing degrees of viscosity, or resistance to flow. Viscosity depends on the measure of internal friction in a liquid. Liquids having high viscosity are thicker and stickier in consistency than liquids with low viscosity. High viscosity liquids flow more slowly.

## Possible Misconceptions

- Students may think that the amount of liquid in one container can change if it is poured into another container. For example, if the liquid in a coffee mug is poured into a tall, narrow flower vase, students may believe that there is more water in the vase than there was in the mug.
- When describing the colour of water, vinegar, and similar liquids, students may use words such as “clear.” Explain that this is actually a measure of the liquid’s transparency and that the word they should use is “colourless.”

# ACTIVATE

### Observing Liquids

Display several clear plastic containers in a variety of shapes and sizes. Invite student volunteers to come up one at a time and pour a measured amount of coloured water from one container to another. The rest of the class should observe how the liquid behaves in each case.

Then invite a few students to transfer an amount of liquid from a clear mug to a shallow foam tray to a baggie. Ask students to recall what happened during the previous teaching plan when they transferred modelling clay/chocolate into these same containers. Ask:

- **What happens to the shape of the liquid when it goes from one container to another?**
- **How is this different from how the solid behaved?**
- **What are some ways that liquids are different from solids?**

Elicit from students that liquids change to take the shape of the container they are in, but solids do not; and that liquids flow, but solids do not. (See the Science Background section for a clarification of solids that seem to “flow.”) Begin a Properties of Liquids Anchor Chart on chart paper or the IWB, with the first two points being “liquids change to take the shape of



**IWB Activity:**

- Students can use
- Activity 5: *What liquid am I?* (see the Teacher's Website) to predict the liquids based on their descriptions.

their container” and “liquids flow or pour.” Invite students to record any questions they may have on the I Wonder Wall.

### Describing Liquids

Refer students to the Properties of Solids Anchor Chart created in *How Can We Describe Solids* (see pages 18–23). Review the properties of solids, and then ask students which of these properties they might be able to observe in liquids (e.g., colour, texture). Pencil in a question mark beside each of the properties they mention. Tell students that they will have the opportunity to check their predictions and discover some other properties of liquids.

## CONNECT



### Observing Properties

Group students into small groups and provide each group with four small clear plastic cups containing samples of different liquids (e.g., glue, milk, vinegar, juice, cooking oil, chocolate sauce, hand lotion, shampoo). Have each group investigate its liquids by observing colour, smell, and behaviour. Encourage students to pour each liquid slowly into various containers (e.g., mug, bowl, test tube, square pan) and observe how it flows. Students may wish to take notes in their Science Journals.

**Note:** See the Possible Misconceptions section on page 26 for how to help students differentiate between a lack of colour in a liquid and a high degree of transparency.

### Sequencing Liquids

Perform a “swirl test” with equal quantities of apple juice, hair conditioner, and molasses, in separate clear containers of the same size and shape. Have students observe how easy or difficult it is to swirl, or move, each liquid, and then work as a class to order, or sequence, the three liquids from easiest to most difficult to swirl. When the class has agreed on the sequence, label each container “1,” “2,” or “3” with sticky notes. Draw a continuum/two-headed arrow on chart paper and label it with the names of the liquids in order. (Match the format of BLM *Sequencing Liquids* on page 30.)

Ask students for other ideas for ordering or sequencing liquids, and write their responses on chart paper (e.g., from thickest to thinnest, from fastest-to slowest-flowing, from easiest to hardest to see through). Ask each group to choose one method (including from easiest to hardest to swirl) and to sequence their liquids from the *Observing Properties* activity accordingly. Students should label their liquids with numbered sticky notes. Once a group’s



sequence has been checked and approved, students can fill in the continuum on BLM *Sequencing Liquids*, adding pictures of their liquids in the sequence they determined. Invite students to share their results with the class. Remind students to store their completed BLMs in their Science Folders.

## CONSOLIDATE

### Liquids Anchor Chart

Have each group explain how it sequenced its liquids. Record any new points on the Properties of Liquids Anchor Chart (e.g., “liquids pour or flow at different speeds,” “some liquids are thicker or thinner than others,” “some liquids are more see-through than others”). Take this opportunity to introduce vocabulary such as “viscous/viscosity” (how easily a liquid flows) and “transparent/transparency” (how easily we can see through a liquid). Add these words to the Word Wall, along with “sequence.”

Revisit the Properties of Solids Anchor Chart and have students confirm or reject their predictions from the *Describing Liquids* activity. Copy any points from this chart to the Liquids Anchor Chart (e.g., “liquids have a colour”). Students should copy the completed Anchor Chart into their Science Journals. Students can add new questions they may have to the I Wonder Wall.

Display Science Card 3 and ask students to identify the seven liquids shown (water, hand soap, honey, strawberry smoothie, ketchup, maple syrup, paint). Write the name of each liquid on a sticky note and place it on the card. Invite students to describe the properties of each liquid. If necessary, prompt by asking:

- What does it look like?
- How do you think it feels?

Discuss how the descriptions of each liquid support the properties of liquids as noted on the Properties of Liquids Anchor Chart.

### Viscosity Race

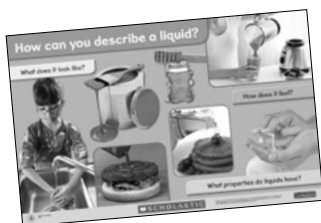
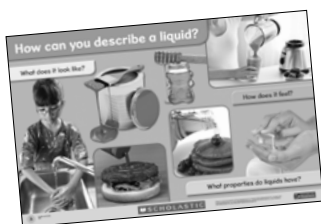
Invite students to examine Science Card 4. Ask:

- What do you think is happening in the picture?
- What materials were needed to hold the race?

Tell students that the picture is showing a “Viscosity Race” (review the meaning of “viscosity” as needed) with a variety of liquids (water, hand soap, maple syrup, and ketchup). Ask:

- Which liquid do you think won the race? Why?
- Does the winner have the highest viscosity or the lowest viscosity?

Group students into different small groups. Display a variety of liquids (e.g., glue, milk, vinegar, juice, cooking oil, chocolate sauce, hand lotion, shampoo, and any of the liquids shown on Science Card 3). Have each small group choose



four liquids to race. Provide measuring spoons and small clear plastic cups for students to measure out equal amounts (30 ml) of their chosen liquids.

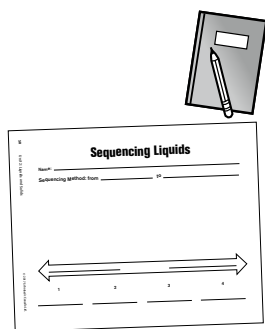
**Note:** This activity may require a volunteer to assist students and provide supervision as needed.

Make sure students understand that the winner of the race should be the liquid with the lowest viscosity, or the lowest amount of thickness/stickiness. Have each group discuss among themselves which liquid they predict will win their race and record their prediction on a sticky note. If group members disagree, they should write each prediction on a sticky note with the name(s) of the members making the prediction.

Assist each group in setting up a piece of parchment-paper-covered cardboard with the bottom edge resting in a foil pan. The cardboard should be propped up solidly on an angle. Once all groups are set up for their race, have two students in each group stand behind their piece of cardboard, holding one of the four cups of liquids in each hand. Remind students that the liquid that reaches the foil pan first is the winner.

Count down from three to have all groups tip their cups at the same time. Students should observe and record their group's results, and then assign a "Viscosity Value" from 1–4 to each liquid (with 4 being the highest viscosity, or the slowest racer). Have students record the results of their group's race in their Science Journals by drawing an illustrated viscosity continuum. (Students could alternatively fill out another copy of BLM *Sequencing Liquids*.)

This process can be repeated with all of the 1s to see which liquid in the class is the overall winner, or has the lowest viscosity of all.



## EXPLORE MORE

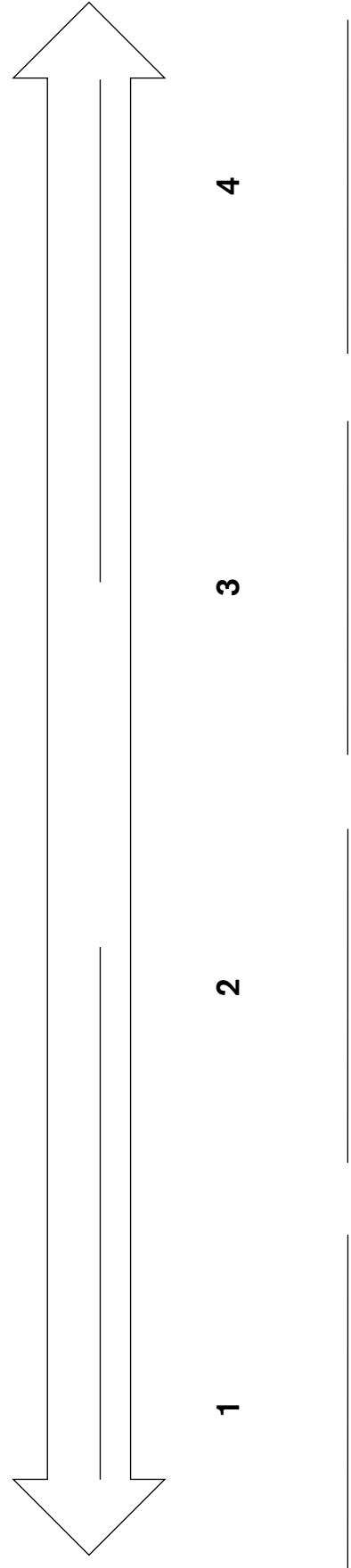
### What Liquid Am I?

Divide students into two groups. Give one group a slip of paper with the name of a liquid written on it. Have students in this group describe the properties of the liquid to the other group, without mentioning the name of the liquid. The other group must guess the liquid based on the clues. Once the liquid has been identified, have groups change roles.

# Sequencing Liquids

Name: \_\_\_\_\_

Sequencing Method: from \_\_\_\_\_ to \_\_\_\_\_



1 2 3 4

\_\_\_\_\_