Liquids and Solids

Teacher's Notes

Ontario Science and Technology Curriculum 1999
Strand: Matter and Materials
Topic: Properties of Liquids and Solids
Grade: 2

Overall Expectations:
- demonstrate an understanding of the properties of familiar liquids (eg. vinegar, detergent, water, oil) and solids (eg. sugar, salt, sand), and of interactions between liquids and between liquids and solids
- investigate the properties of and interactions between liquids and between liquids and solids and identify the types of objects or materials that can be used to contain liquids and solids (eg. a plastic bowl will hold a liquid or a solid but a paper towel will only hold a dry solid)
- identify and describe ways in which we use our knowledge of liquids and solids in making useful objects and in living in our environment
* All specific expectations are covered by this unit and are mentioned at the end of each activity with the exception of the following which are covered by all activities.
MM10:plan investigations to answer some of these questions or solve some of these problems, and describe the steps involved

Materials box			
milk water juice chocolate syrup bubbles dish soap molasses vegetable oil vinegar chocolate bar candles flour baking soda	sugar salt sand powered milk jell-o crystals rocks matches jars (8) kettle masking tape marker food colouring popsicle sticks	ice cubes powdered soap long neck bottle funnel bowls (2) spoon paper tin turkey pan bond paper paper towels cotton polar fleece wood	plastic wrap kitty litter box styrofoam cup paper plate plastic cup paper clip classroom toys cork

Dear Parent or Guardian,

We are beginning our next Science and Technology Unit, Matter and Materials, Properties of Liquids and Solids. By the end of this unit, your child will:

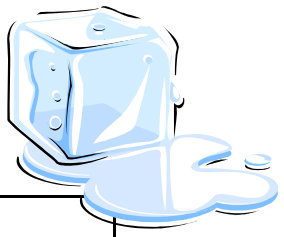
- demonstrate an understanding of the properties of familiar liquids (eg. vinegar, detergent, water, oil) and solids (eg. sugar, salt, sand), and of interactions between liquids and between liquids and solids
- investigate the properties of and interactions between liquids and between liquids and solids and identify the types of objects or materials that can be used to contain liquids and solids (eg. a plastic bowl will hold a liquid or a solid but a paper towel will only hold a dry solid)
- identify and describe ways in which we use our knowledge of liquids and solids in making useful objects and in living in our environment

As outlined in the Science and Technology Curriculum, Ministry of Education , 1999.

Home Links:
To help your child further their understanding of this science unit, here are some fun activities for you and your family:

- bake with your child (this demonstrates how solids and liquids mix and make yummy results).
- talk about the different states of water that come down from the sky (rain, snow, freezing rain).
- play with boats in the bathtub and talk about what makes them float.

Happy Adventures,



Liquids and Solids
Our New Science Words

Grade 2 MMglossary covers:
MM11:use appropriate vocabulary in describing their investigations, explorations, and observations (eg. use such words as clear, runny, and greasy when describing liquids, and granular, hard, and opaque when describing solids)

Properties of Liquids and Solids
Safety Symbols

Before we start our liquids and solids unit, there are some important symbols we have to know. Glue the symbol in the correct circle.

CORROSIVE

POISONOUS

EXPLOSIVE

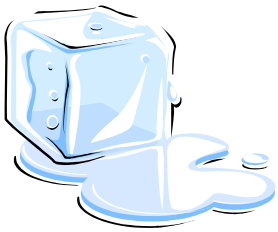
COMBUSTIBLE and FLAMMABLE

There are some important words we need to know too. Let's write them down on our special notepad below.

Caution
Warning
Danger
Attention

Grade 2 MMactivity001 covers:
MM21:recognize international symbols that give us information on the safety of substances (eg. household cleaners, cleansers, bleaches) and Canadian Safety Association signage when working with liquids and solids

** Photocopy and cut into strips for students.**



Properties of Liquids and Solids
Looking at Liquids and Solids

As a class let's make a list of liquids and solids we can see around our classroom. Write the list on your special notepad below:

**** Bring in a variety of liquids and solids for your students to see around the classroom (chocolate bars, candles (matches to turn the wax into a liquid) and jellow are some examples).****

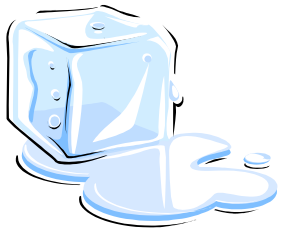
Liquids	Solids
water, milk, juice, chocolate syrup, bubbles, dish soap, molasses, vegetable oil, vinegar etc . . .	*ice, chocolate bar, candle wax, flour, baking soda, sugar, salt, sand, powdered milk, jell-o crystals, rocks etc . . .*

As a class let's make a list describing the properties of liquids and solids. Write the list down on your special notepad below:

**** With the water show how it pour from container to container, taking it's shape, is it still a liquid?. Show that with a chocolate bar you can break it, are the pieces still a solid?. Put the ice in a clear container and show how it doesn't fill the entire space. Light the candle to show the wax melting, then blow it out and show how it returns to a solid while making this list.****

Liquids	Solids
- takes the shape of the container *- you cannot take it out of it's container or it will spill all over* *- you can pour it from one container to another* *- it will turn into a solid if you cool it*	*- it is a three dimensional shape* *- you can pick it up* *- you can break it* *- a solid will turn to a liquid when you heat it*

Grade 2 MMactivity002 covers:
MM1:describe the properties of liquids and solids, using their observations
MM4:recgonize that the states of liquids and solids remain constant in some circumstances (eg. solids remain solid when broken; liquids remain liquid when poured), but may change in other circumstances (eg. liquids may freeze when the temperature drops; solids may melt when the temperature drops; solids may melt when heated)
MM14:compare the properties of liquids with those of solids to determine which materials take the shape of their container (eg. water will fill a margarine container completely but ice cubes will leave spaces)
MM20:identify objects in the immediate environment as solids (eg. sand, ice, rocks) or liquids (eg. milk, vinegar, water)



Properties of Liquids and Solids
The Three States of Water

There are three different states of water; solid, liquid and gas. Using four out of your five senses (look, touch, smell and listen - Do NOT taste) describe the ice and water. Draw what you see. Describe, using words, what you feel, smell and hear. Using only one of your five senses describe water gas. Draw and describe, using words, what you see. Why would you not be allowed to touch the water gas? *Because it is hot.*

Draw a picture			
Describe using words	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____
State	_____	_____	_____

How did we make water vapour? *We put water in a kettle to boil.*
How would we make ice? *We would put water in a freezer.*

Grade 2 MMactivity003 covers:
MM3:describe, using their observations, the characteristics of the three states of water, and identify the conditions that cause changes from one state to another (eg. water turns to ice when placed in a freezer)
MM9:ask questions about and identify needs and problems related to the use of liquids and solids, and explore possible answers and solutions (eg. devise and explain a plan to build a model raft; predict changes that will occur when ice or water is heated or cooled

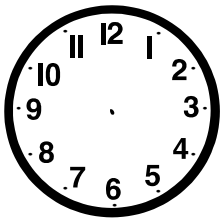
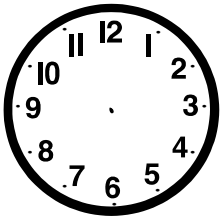
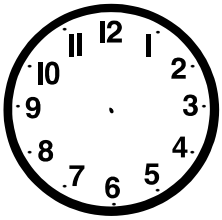
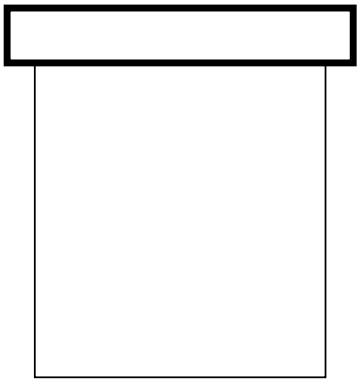
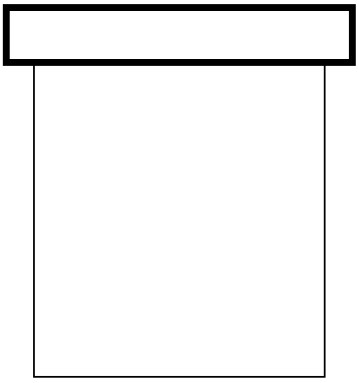
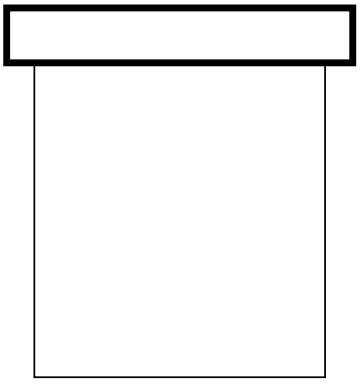
Properties of Liquids and Solids
Changing States

****Review from the lesson before that solids remained solids when broken and liquids remained liquids when poured from one container to the next.****

Purpose: *To watch what happens to water when the temperature changes.*

Materials:
1) a jar
2) water
3) freezer

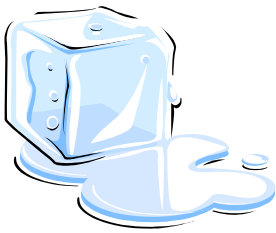
Method:
1) Pour water into the jar. ****Talk about how the water takes the shape of the jar.****
2) Draw what the jar looks like and record the time.
3) Place the jar in the freezer.
4) Later that day, take the jar out of the freezer and draw what it looks like and record the time.
5) Leave the jar on a desk.
6) Later that day, draw what it looks like and record the time.

		
		
What will happen when we place it in the freezer? _____	What will happen when we leave it on the desk? _____	

Can solids turn into liquids? *Yes, by heating them.*

Can liquids turn into solids? *Yes, by cooling them.*

Grade 2 MMactivity004 covers:
MM4:recognize that the states of liquids and solids remain constant in some circumstances (eg. solids remain solid when broken; liquids remain liquid when poured), but may change in other circumstances (eg. liquids may freeze when the temperature drops; solids may melt when heated)
MM5:identify reversible changes in materials (eg. the changing of ice to water)
MM9:ask questions about and identify needs and problems related to the use of liquids and solids, and explore possible answers and solutions (eg. devise and explain a plan to build a model raft; predict changes that will occur when ice or water is heated or cooled)



Properties of Liquids and Solids
Looking at Liquids

Materials:
1) a variety of liquids in plastic cups, labelled A, B, C . . .

Method:
1) Choose a cup of liquid.
2) Using three out of five of your senses describe the liquid and fill in the chart below.
****One liquid should be water, pick any other four.****

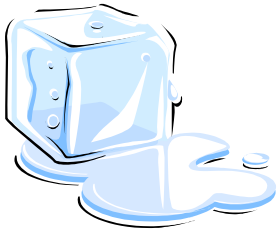
Sense	Liquid A	Liquid B	Liquid C	Liquid D	Liquid E
Look					
Smell					
Feel					
I think it is . . .					

Which liquid was your favourite?_____

Why was it your favourite?_____

How is your favourite different than water?_____

Grade 2 MMactivity005 covers:
MM12:record relevant observations, findings, and measurements, using written language, drawings, charts, and concrete materials (eg. record data from experimentation with liquids and solids on a chart; list characteristics of different liquids that they have observed)
MM17:compare the properties of water with the properties of at least one other liquid (eg.. detergent, oil, molasses)



Properties of Liquids and Solids
Mixing Liquids Together

Purpose: *To find out what liquids mix with water.*

Materials:
1) chocolate syrup
2) juice
3) molasses
4) food colouring
5) oil
6) vinegar
7) liquid soap
8) eight glasses of water
9) eight popsicle sticks

Method:
1) Choose a liquid.
2) Pour it into a glass of water and stir with a popsicle stick.
3) Record the results in the chart below.
4) Repeat steps 1 to 3 with a different solid.

Liquid	chocolate syrup	juice	molasses	food colouring	oil	vinegar	liquid soap
Did it Mix							

What did you learn?

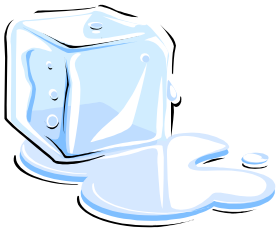
_____

_____

_____

_____

Grade 2 MMactivity006:
MM16:describe, using their observations, the behaviour of various liquids (eg. water, oil) when poured on different surfaces (eg. rough wood, smooth wood, cloth), when combined with solids (eg. powdered milk), and when combined with other liquids (eg. vinegar), and explain how the reactions they observe determine the uses of these liquids and solids



Properties of Liquids and Solids
Mixing Solids and Liquids

Purpose: *To find out which solids dissolves in water.*

Materials:
1) sugar
2) salt
3) sand
4) rocks
5) ice
6) powdered milk
7) soap
8) eight glasses of water
9) eight popsicle sticks

Method:
1) Choose a solid.
2) Pour it into a glass of water and stir with a popsicle stick.
3) Record the results in the chart below.
4) Repeat steps 1 to 3 with a different solid.

Solid	sugar	salt	soap powder	sand	rocks	ice	powder milk
Did it Dissolve							

What did you learn?

_____

_____

_____

_____

Grade 2 MMactivity007:
MM2:distinguish between solids that dissolve in water (eg. sugar) and solids that do not (eg. sand)
MM6:identify, through observation, various substances that are buoyant (eg. wood, oil), that can absorb another substance (eg. paper towel), and that can dissolve another substance (eg. water)
MM12:record relevant observations, findings, and measurements, using written language, drawings, charts, and concrete materials (eg. record data from experimentation with liquids and solids on a chart; list characteristics of different liquids that they have observed)
MM16:describe, using their observations, the behaviour of various liquids (eg. water, oil) when poured on different surfaces (eg. rough wood, smooth wood, cloth), when combined with solids (eg. powdered milk), and when combined with other liquids (eg. vinegar), and explain how the reactions they observe determine the uses of these liquids and solids

Properties of Liquids and Solids
The Volcano and The Fireworks

Materials:
1) a long neck bottle, wrapped in black construction paper and placed on a tinfoil plate (decorations optional)
2) 60 mL of baking soda
3) 200 mL of vinegar
4) red food colouring
5) funnel

Method:
1) Using the funnel pour the baking powder into the long neck bottle.
2) Mix the red food colouring and vinegar together.
3) Using the funnel pour the red vinegar into the long neck bottle. Be sure to take the funnel away quickly!

I spy with my little eye:	Describe what happened with words: _____ _____ _____ _____ _____

What did you learn? *That mixing some liquids and solids can be dangerous.*

Materials:
1) a big clear bowl
2) a second bowl
2) water
3) oil
4) various colours of food colouring
5) spoon

Method:
1) Fill ⅓ of the clear bowl with water.
2) In a separate bowl mix the oil and food colouring.
3) Pour the oil and food colouring mixture into the water bowl.

I spy with my little eye:	Describe what happened with words: _____ _____ _____ _____ _____

Grade 2 MMactivity008 covers:
MM16:describe, using their observations, the behaviour of various liquids (eg. water, oil) when poured on different surfaces (eg. rough wood, smooth wood, cloth), when combined with solids (eg. powdered milk), and when combined with other liquids (eg. vinegar), and explain how the reaction they observe determine the uses of these liquids and solids;

Properties of Liquids and Solids
Making Glue

Purpose: *To use household items to make glue.*

Materials:
1) a bowl
2) a spoon
3) flour
4) water
5) one small, square piece of paper

Method:
1) Pour the flour into the bowl.
2) Pour the water into the bowl gradually, constantly stirring.
3) Place a small bit of paste onto the piece of paper.
4) "Glue" the piece of paper inside the box below.

****Cut a piece of paper that will fit inside this box.****

What did the paste feel like? *Sticky*

How could you make different coloured glues? *Add food colouring.*

Grade 2 MMactivity009 covers:
MM19:describe, using their observations, some ways in which solids and liquids can be combined to make useful substances (eg. flour and water make paste)

Properties of Liquids and Solids
What is the Quicker Picker Upper?

Purpose: *To find out what material would be the quickest picker upper.*

Materials:
1) water
2) a tin turkey pan
3) bond paper
4) paper towels
5) cotton
6) polar fleece
7) wood
8) plastic wrap

Method:
1) Pour some of the water into the turkey pan.
2) Wipe it up with one of the materials.
3) Record your results in the chart below.
4) Repeat steps 1 to 3 for the rest of the materials.

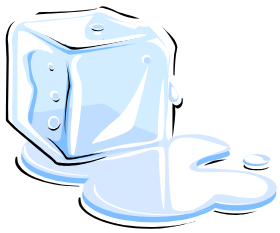
Material	bond paper	paper towels	cotton	polar fleece	wood	plastic wrap
Rating bad OK good great						

Which material would you use to wipe up a spill?_____

Which material would you not use to wipe up a spill?_____

**** As a corresponding language activity you could have the students make a commercial advertising the quickest picker upper.****

Grade 2 MMactivity010 covers:
MM6:identify, through observation, various substances that are buoyant (eg. wood, oil), that can absorb another substance (eg. paper towel), and that can dissolve another substance (eg. water)
MM15:compare different materials with respect to their capacity to absorb, and identify ways in which this capacity determines how these materials are used (eg. bond paper, paper towels, cotton, linen, wood, plastic)
MM16:describe, using their observations, the behaviour of various liquids (eg. water, oil) when poured on different surfaces (eg. rough wood, smooth wood, cloth), when combined with solids (eg. powdered mild), and when combined with other liquids (eg. vinegar), and explain how the reactions they observe determine the uses of these liquids and solids



Properties of Liquids and Solids
What's Buoyant?

Let's write down the definition of buoyancy:
Buoyancy is the upward force on an object in a liquid. Buoyancy allows boats to float.

Purpose: *To find out what materials are buoyant in water.*

Materials:
1) a kitty litter box
2) water
3) wood
4) styrofoam cup
5) paper plate
6) plastic cup
7) paper clip
8) toys from around the classroom
9) cork

Method:
1) Fill the kitty litter box with water.
2) Choose one object.
3) Make a prediction of whether it will float or not.
4) Place it in the water.
5) Record your results in the chart below.
6) Repeat steps 2 through 5 for the other objects.

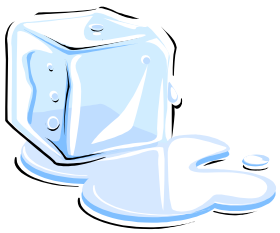
Object	Wood	Styrofoam cup	Paper plate	Plastic cup	Paper clip	Toy	Cork
Prediction (float or sink)							
Results (float or sink)							

If you were going to build a boat, what materials would you use?

_____

Why?_____

Grade 2 MMactivity011 covers:
MM6:identify, through observation, various substances that are buoyant (eg. wood, oil) that can absorb another substance (eg. paper towel), and that can dissolve another substance (eg. water)

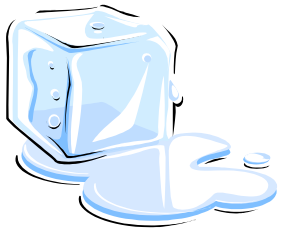


Properties of Liquids and Solids
Let's Make a Book

As a class we are going to make a book! In this book we are going to write about our "Properties of Liquids and Solids" science unit. Pick your favourite science activity and describe it using pictures and words.

**** Make a booklet out of it and place it in the classroom library for the students to read.****

MMactivity012 covers:
MM13:communicate the procedures and results of investigations for specific purposes, using demonstrations, drawings, and oral and written descriptions (eg. write a booklet for the school library describing class experiments in investigating liquids and solids)



Solids and Liquids Certificate

This certificate hereby certifies

_____

as a Grade 2 Solids and Liquids expert.

_____ _____

Principal Teacher

Share your science booklet with at least one family member at home. After you have shared complete the following:

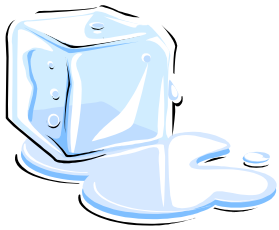
1) Cut out your Solids and Liquids Certificate.
2) Get the person you shared your science booklet with to fill out the form below, detach it and bring it back to school.

C .....

_____ shared their science booklet with the following family members:

_____

Parent's Signature



Properties of Liquids and Solids
Homework

Due:_____

Name:_____

With a parent or guardian tour your household for products that have a safety symbol on it. Fill in the chart below:

Product	What is it used for?	What symbol do you see on it?	What does the symbol mean?

Remember your safety symbols!

Symbol				
Meaning	Corrosive	Poisonous	Explosive	Combustible and Flammable

With a parent or guardian tour your household for a variety of liquids (without safety symbols). Fill in the chart below:

Names of the liquids in my home . . .	What the liquid is used for . . .

Grade 2 MMHomework covers:
MM18:identify liquids used in the home and describe how they are used (eg. milk for drinking and cooking; detergent for cleaning)
MM21:recognize international symbols that give us information on the safety of substances (eg. household cleaners, cleansers, bleaches) and Canadian Safety Association signage when working with liquids and solids.

Properties of Solids and Liquids
Homework

Due:_____

Name:_____

Design and build an object that is buoyant and can hold 5 paper clips without sinking. Please return this sheet with the project to save paper.

List the materials you used:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Method (Describe how you built it):

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Why did you choose the materials that you used?

_____

_____

_____

	Level 1	Level 2	Level 3	Level 4
Inquiry and design skills	- object is buoyant and can hold 5 paper clips	- object has a simple design and appropriate materials were used	- object has an resembles a real life object and appropriate materials were used	- object is buoyant holding more than 5 paper clips - materials were creatively used in the design of the object

Grade 2 MMhomework002 covers:
MM7:evaluate the appropriateness of the materials chosen in the design and used in the construction of a structure that is intended to float (eg. polystyrene, paper, metal, wood)
MM8:design and assemble, using given materials, an object that is buoyant and able to support a given mass, and identify and describe the materials and tools they used.
MM9:ask questions about and identify needs and problems related to the use of liquids and solids, and explore possible answers and solutions (eg. devise and explain a plan to build a model raft; predict changes that will occur when ice or water is heated or cooled)