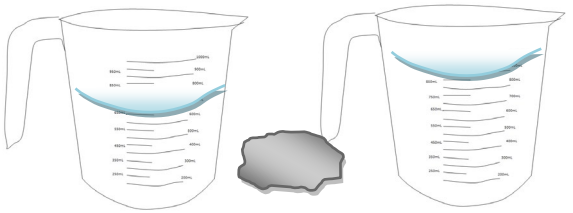
VOLUME, CAPACITY – LIQUID UNITS, DISPLACEMENT.

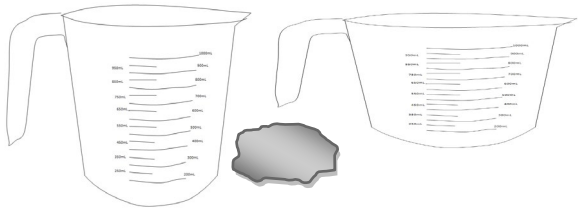
INVESTIGATIONS OVERVIEW PAGE
THIS PAGE IS A SUMMARY OF THE INVESTIGATIONS THAT STUDENTS MAY ENGAGE IN TO DEEPEN THEIR RELATIONAL UNDERSTANDING.
NVESTIGATIONS WITH INSTRUCTIONS TO STUDENTS FOLLOW ON SUBSEQUENT PAGES.

- In pairs or small groups, children estimate the capacity of a container, in millilitres, and in litres and millilitres, and in halves or quarters of litres, for example, 1L 250mL = 1250mL = $1\frac{1}{4}$ L. They then measure the capacity of the container using the scale on a measuring device. They record the container's capacity as the volume of water it can hold when filled to capacity. Reflection: How can we measure volume and capacity in litres and millilitres, millilitres, and halves and quarters of litres?
- In pairs, children select objects with curved surfaces that will sink and a measuring device with scale marked in millilitres. They pour a volume of water into the measuring device. They estimate the volume of water the object will displace. They submerge the object in the water in the measuring device to check. Reflection: How can we measure the volume of objects using displacement?
- In pairs or small groups, students use the scale on measuring devices to measure the capacities of small and large containers, including containers with a capacity of 500 mL and 250 mL. They record each container's capacity as the volume of water it can hold when filled to capacity in litres and millilitres and/or in millilitres, and/or in halves and quarters of litres. They place the containers in order of capacity. Reflection: How can we measure, compare and order volume and capacity in litres and millilitres, millilitres, and halves and quarters of litres?
- In pairs or small groups, children use a measuring jug to measure the capacities of containers with the same volume but different dimensions, for example, margarine containers. They fill the container to capacity with water, then measure the volume of water. They label each container's capacity in litres and millilitres and/or in millilitres and/or in halves or quarters of a litre, identifying that a container may have the same volume but different dimensions. Reflection: Can different containers have the same capacity?
- In pairs, children select 2 containers – one short and wide, one tall and narrow. They predict which container will have greater capacity, then measure their capacities in litres and millilitres and/or in millilitres and/or in halves or quarters of a litre. Reflection: Can different containers have the same capacity?
- In pairs, children measure the capacities of 2 containers. They record each container's capacity as the volume of water it can hold when filled to capacity in litres and millilitres and/or in millilitres and/or in halves or quarters of a litre. They find a container with a capacity between the two containers. They record the new container's capacity as the volume of water it can hold when filled to capacity in litres and millilitres and/or in millilitres and/or in halves or quarters of a litre. Reflection: How can we measure, compare and order volume and capacity in litres and millilitres, millilitres, and halves and quarters of litres?
- Children investigate containers at home with capacities measured in millilitres and litres. (European and Arabic liquid bottles and containers are often measured in centilitres - cL) Reflection: What liquid units of measurement are used to measure volume and capacity?

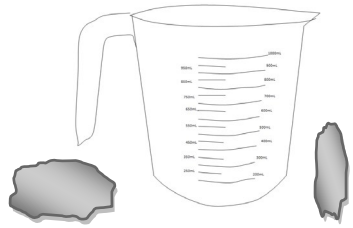
- In pairs, children select objects with curved surfaces that will sink and an appropriate measuring container. They measure the volumes of each object using displacement. They place the objects in order of their volumes. Reflection: How can we measure, compare and order the volumes of objects using displacement?
- In pairs, children select objects with curved surfaces that will sink and a measuring device with scale marked in millilitres. They pour a volume of water into the measuring device. They estimate the volume of water the object will displace. They submerge the object in the water in the measuring device to check. They repeat with a different volume of water in the measuring device. They compare the volume of water displaced each time, identifying that the volume of water displaced doesn't change and the volume of the object doesn't change. Reflection: How can we measure the volume of objects using displacement?



- In pairs, children select objects with curved surfaces that will sink and 2 measuring devices with scale marked in millilitres, one tall and thin, one short and wide. They pour the same volume of water into both measuring devices. They submerge the object in the water in measuring device 1 and record the volume of water displaced / volume of the object. They submerge the object in the water in measuring device 2 and record the volume of water displaced / volume of the object. They compare the volume of water displaced each time, identifying that the volume of water displaced doesn't change and the volume of the object doesn't change. Reflection: How can we measure the volume of objects using displacement?



- In pairs, children select some modelling clay or plasticine and a measuring device marked in millilitres. They mould the modelling clay into a ball, submerge it in water and measure its volume using displacement. They mould the same modelling clay into a different shape, submerge it in water and measure its volume using displacement. They compare the volume of water displaced each time, identifying that the volume of water displaced doesn't change and the volume of the object doesn't change if the object's shape changes. Reflection: How can we measure the volume of objects using displacement?



Volume, Capacity – Liquid Units, Displacement.

Have a container, and a measuring jug.

Estimate the capacity of the container in

- millilitres, and/or
- litres and millilitres, and/or
- half or quarters of a litre.

Measure the capacity of the container using the scale on a measuring jug.

Record the container's capacity as the volume of water it can hold when filled to capacity in

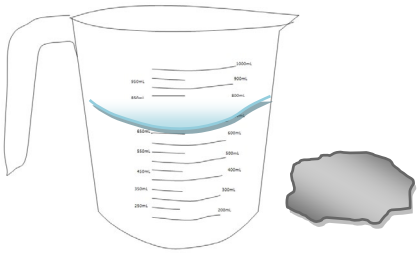
- millilitres, and/or
- litres and millilitres, and/or
- half or quarters of a litre.

Reflection: How can we measure volume and capacity in litres and millilitres, millilitres, and halves and quarters of litres?

Volume, Capacity – Liquid Units, Displacement.

Have a container, and a measuring jug.

Select an object with curved surfaces that will sink and a measuring device with a scale in millilitres.



Pour a volume of water into the measuring device, for example, 500 millilitres or $\frac{1}{2}$ litre.

Record the volume of water.

Estimate the volume of water the object will displace.

Submerge the object in the water in the measuring device to measure the volume of water it displaces.

Record the volume of water the object displaced as the volume of the object.

Reflection: How can we measure the volume of objects using displacement?

Volume, Capacity – Liquid Units, Displacement.

Have a container, and a measuring jug.

Have 2 or more containers, and a measuring jug.

Measure the capacities of the containers using the scale on a measuring jug.

Record each container's capacity as the volume of water it can hold when filled to capacity in

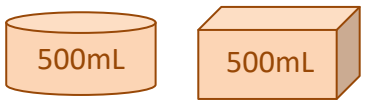
- millilitres, and/or
- litres and millilitres, and/or
- half or quarters of a litre.

Place the containers in order of capacity.

Reflection: How can we measure, compare and order volume and capacity in litres and millilitres, millilitres, and halves and quarters of litres?

Volume, Capacity – Liquid Units, Displacement.

Have a different margarine, cream or ice cream container labelled with the same volume, for example,



Use a measuring jug to measure the capacity of your container by filling each container to capacity with water and measuring the volume of water.

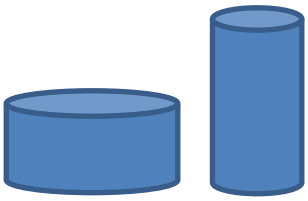
Label each container's capacity in litres and millilitres and/or in millilitres and/or in halves or quarters of a litre.

Do both containers have the same capacity?

Each of you record both containers and their capacities.

Reflection: Can different containers have the same capacity?

Volume, Capacity – Liquid Units, Displacement.



Have a different margarine, cream or ice cream

Select 2 containers with the same capacity – one short and wide, one tall and narrow, for example, a 1L drink bottle and a 1L ice cream container.

Measure the containers' capacities.

Reflection: Can different containers have the same capacity?

Volume, Capacity – Liquid Units, Displacement.

Measure the capacities of 2 containers.

Record each container's capacity as the volume of water it can hold when filled to capacity in litres and millilitres and/or in millilitres and/or in halves or quarters of a litre.

Find a container with a capacity between the two containers.

Record the new container’s capacity as the volume of water it can hold when filled to capacity in litres and millilitres and/or in millilitres and/or in halves or quarters of a litre.

Reflection: How can we measure, compare and order volume and capacity in litres and millilitres, millilitres, and halves and quarters of litres?

Volume, Capacity – Liquid Units, Displacement.

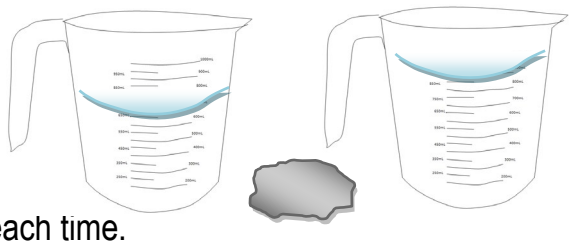
Measure the capacities of 2 containers.

Select an object with curved surfaces that will sink and a measuring device with a scale in millilitres.

Pour a volume of water into the measuring device, for example, 500 millilitres or $\frac{1}{2}$ litre.

Estimate the volume of water the object will displace.

Submerge the object in the water in the measuring device to check.



Repeat with a different volume of water in the measuring device, for example, 900 millilitres.

Record and compare the volume of water displaced each time.

Did the volume of water displaced change?

Did the volume of the object change?

Reflection: How can we measure the volume of objects using displacement?

Volume, Capacity – Liquid Units, Displacement.

Investigate containers at home with capacities measured in millilitres and litres.

(European and Arabic liquid bottles and containers are often measured in centilitres - cL)

Reflection: What liquid units of measurement are used to measure volume and capacity?

Volume, Capacity – Liquid Units, Displacement.

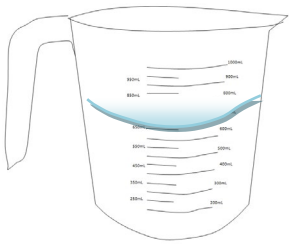
Select objects with curved surfaces that will sink and a measuring device with a scale in millilitres.

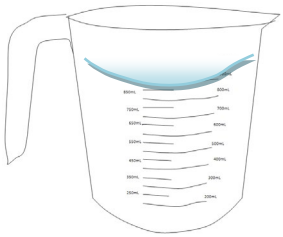
Measure the volumes of each object using displacement.

Place the objects in order of their volumes.

How can we measure, compare and order the volumes of objects using displacement?

Volume, Capacity – Liquid Units, Displacement.





Select objects with curved surfaces that will sink.

Select a measuring device with scale marked in millilitres.

Pour a volume of water into the measuring device.

Estimate the volume of water the object will displace.

Submerge the object in the water in the measuring device to check.

Repeat with a different volume of water in the measuring device.

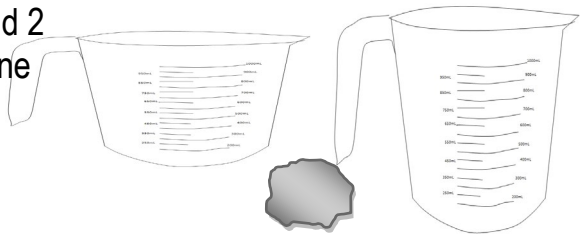
Compare the volume of water displaced each time.

Was the volume of water displaced the same each time?

Was the volume of the object the same each time?

Reflection: How can we measure the volume of objects using displacement?

Volume, Capacity – Liquid Units, Displacement.



Select an object with curved surfaces that will sink and 2 measuring containers – one shorter and wider, and one taller and thinner, for example,

Pour the same volume of water into each measuring container, for example, 500 millilitres or $\frac{1}{2}$ litre.

Submerge the object in the water in measuring container 1 and record the volume of water displaced / the volume of the object.

Submerge the object in the water in measuring container 2 and record the volume of water displaced / the volume of the object.

Did the volume of water displaced / volume of the object change when the shape of the container changed?

Reflection: How can we measure the volume of objects using displacement?

Volume, Capacity – Liquid Units, Displacement.

Select some modelling clay or plasticine and a measuring device marked in millilitres.

Mould the modelling clay into a ball.

Submerge it in water and measure its volume using displacement.

Mould the same modelling clay into a different shape.

Submerge it in water and measure its volume using displacement.

Compare the volume of water displaced each time.

Did the volume of water displaced change when the modelling clay's shape changed?

Did the volume of the modelling clay change when the its shape changed?

Reflection: How can we measure the volume of objects using displacement?