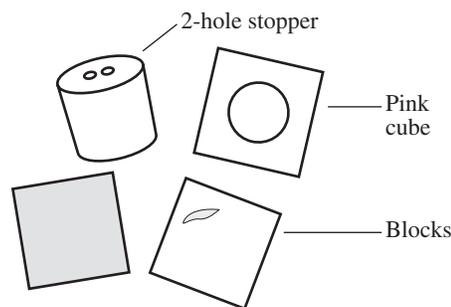


Measurement Lab Station 1 Instruction Sheet

Measure the mass of a variety of objects. Does the shape of the object (regular- versus irregular-shaped) affect how mass is measured?

Materials

- Balance, 0.1-g precision
- Rubber stopper, 2-hole
- Clear block
- Pink block with hole
- White block



Procedure

1. Measure the mass of each of the four objects (*a-d*) listed below.
2. Record the mass of each object on the Measurement Worksheet.
3. Circle the shape of the object (regular or irregular) in the shape column next to the name of the respective object on the Measurement Worksheet.
 - a.* Rubber stopper, 2-hole
 - b.* Clear block
 - c.* Pink block with hole
 - d.* White block

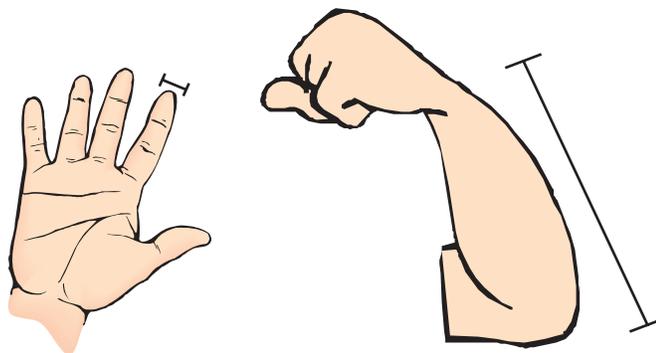
Measurement

Lab Station 2 Instruction Sheet

All civilized nations measure objects. Long ago, kings and queens decreed that measurements should be made using their own body parts as “standards.” Measure the height of two objects using the width of an index finger and the length of an arm from wrist to elbow as the units of measurement.

Materials

- Arm from wrist to elbow
- Index finger width
- Lab stool or chair
- Lab table or desk
- Meter stick or metric ruler



Procedure

1. Choose which group member's index finger will be used for length measurement and use that finger only to measure the height of the lab table or desk. Record the measurement on the Measurement Worksheet.
2. Using the same finger, measure the height of a lab stool or chair and record the measurement on the Measurement Worksheet.
3. Choose which group member's arm will be used for length measurement and use that arm only to measure the height of the lab table or desk. Record the measurement on the Measurement Worksheet.
4. Using the same arm, measure the height of a lab stool or chair and record the measurement on the Measurement Worksheet.
5. Measure the height of the table and stool with a ruler and record the measurement on the Measurement Worksheet.
6. Measure the length of the arm and the index finger width using a ruler and record the measurement on the Measurement Worksheet.

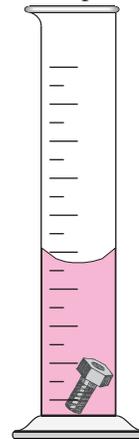
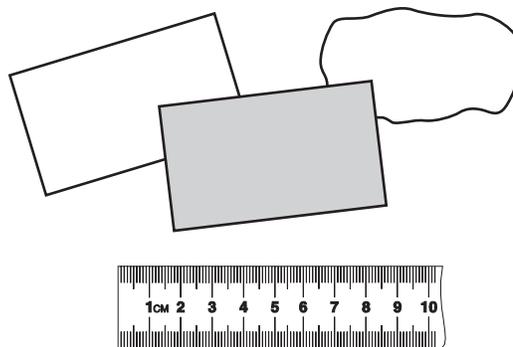
Measurement

Lab Station 3 Instruction Sheet

Determine the volume of objects with a regular shape using a ruler, and the volume of objects with an irregular shape using water displacement.

Materials

- Black block
- Bolt
- Graduated cylinder, 250-mL or 500-mL
- Gray block
- Metric ruler
- Quartz rock, milky white
- Water, tap



Procedure

1. Using the ruler, measure the length, width, and height of each object listed below. Record the measurement on the Measurement Worksheet.
 - a. Black HDPE block
 - b. Gray PVC block
2. Calculate the volume of each object and record the result on the Measurement Worksheet. *Note:* The volumes should be recorded in cm^3 .
3. Using a graduated cylinder and water, determine the volume of each object listed below by water displacement. *Note:* Add these objects slowly into the graduated cylinder.
 - a. Bolt
 - b. Quartz rock
4. Record the volume of each object on the Measurement Worksheet.

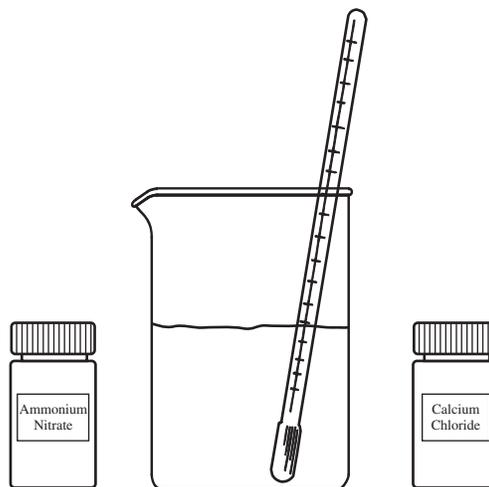
Measurement

Lab Station 4 Instruction Sheet

Measure the temperature changes that result when two different salts are dissolved in water. Identify each process as endothermic (the salt takes in heat from the surroundings when it dissolves in water) versus exothermic (the salt releases heat to the environment when it dissolves in water).

Materials

- Ammonium chloride, NH_4Cl , 10 g
- Magnesium chloride, $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$, 20 g
- Balance, 0.01-g precision
- Beaker, 250-mL
- Stirring rod
- Thermometer
- Water, distilled or deionized, 400 mL
- Weighing dishes, 2



Procedure

1. Fill the beaker with 200 mL of water.
2. Using the thermometer, measure the temperature of the water.
3. Record the initial temperature on the Measurement Worksheet.
4. Add 10 g of ammonium chloride and stir to dissolve.
5. Measure the temperature every 30 seconds for two minutes and record the measurements on the Measurement Worksheet.
6. Dispose of the waste solution as instructed by the teacher.
7. Rinse the beaker with water.
8. Repeat steps 1–7 for 20 g of magnesium chloride.

Measurement

Lab Station 5 Instruction Sheet

Measure the time it takes a metal sphere to travel through two different fluids. Will temperature affect the amount of time it takes the sphere to travel down the tube? Discover the effect of temperature on the viscosity (resistance to flow) of two fluids.

Materials

- Corn syrup tubes, 2
- Polyvinyl alcohol solution tubes, 2
- Ice bath
- Stopwatch

Procedure

1. Hold the room temperature corn syrup tube with the cap end down so that the metal sphere sinks in the fluid and touches the cap.
2. Turn the tube over so that the sphere begins to fall through the fluid toward the bottom of the tube.
3. Using a stopwatch, time how long it takes the metal sphere to travel from one end of the tube to the other.
4. Record the time on the Measurement Worksheet.
5. Repeat the procedure using the corn syrup tube from the ice bath.
6. Repeat steps 1–5 using the polyvinyl alcohol solution tube at room temperature and from the ice bath.

