611-2005 (30-100) Equal Mass Set

The 611-2005 Equal Mass Set contains five handy cylinders in a variety of lengths, with almost identical mass.

Demonstrate the inverse relationship between density and length, with specimens large enough for young fingers to handle.

Concepts Taught:
- Mass
- Volume
- Density
- Specific gravity

Parts List:	Density	Length
Copper	8.9 g/ml	~15mm
Aluminum	2.7 g/ml	~47mm
PVC	1.4 g/ml	~87mm
Nylon	1.13 g/ml	~117mm
Polyethylene	.90 g/ml	~147mm

- *The mass of each sample is ~15g.*
- *Nylon differs from polyethylene in that it is harder and somewhat yellowish in color.*
- *Note: Plastics and alloys vary greatly in density. The above figures are guidelines only.*

Warranty and Parts:

We replace all defective or missing parts free of charge. Additional replacement parts may be ordered toll-free. We accept MasterCard, Visa, checks and School P.O.s. All products warranted to be free from defect for 90 days. Does not apply to accident, misuse or normal wear and tear. Intended for children 13 years of age and up. This item is not a toy. It may contain small parts that can be choking hazards. Adult supervision is required.

You Need:
- **Ruler (metric)**
- **Water**
- **Displacement vessel**
- **Balance (g)**

How To Use:

Demonstrate the concept of buoyancy. Show it is a function of volume only (not mass).

Case 1:

Immerse these specimens, one by one, into water so that water is displaced into another vessel. Tis works well using an overflow can or directly in a graduated cylinder. Is the same amount of water displaced each time? *It would be if you were using specimens of equal volume!* Why not?

Case 2:

Show that a "sinking" body (metal cylinder) is heavier than the upward push or buoyancy it suffers. Compare its weight with the weight of the water dis-placed. In the case of a "floating" object (plastic cylinder) show that the opposite is true. The displaced water actually weights more than the object.

Case 3:

Repeat the floating and sinking experiments using liquids other than water. What do you observe?

Case 4:

Calculate the density by measuring and weighing each sample. First measure the length and diameter of each rod. Divide the diameter by two to calculate the radius. Calculate the volume of a cylinder by using the formula:

$$\pi \cdot r^2 \cdot l$$

Where **r** is the radius and **l** is the length. Calculate the volume using cubic millimeters. Convert your calculation to milliliters by dividing by a factor of 1000.

Next, weigh each mass in grams. Calculate the density of the cylinders by using the formula below:

$$D = M/V$$

Where **D** is the density, **M** is the mass in grams, and **V** is the volume in milliliters. Compare your results with the table at the left. *Water has a density of 1.0g/ml. Does this make sense after you performed Cases 2 and 3? (Consider the one that floats).*

Related Products:

We manufacture a variety of low-cost science labs which are available from most science education distributors. For more information, please contact us.

611-2100 Density Rod

What floats in cold water, sinks in hot? This precision-machined aluminum cylinder. Fits most graduated cylinders. With 4 labs.

611-2085 Overflow Can

Seamless aluminum can with angled plastic spout for catching displaced water.

611-2090 Catchbucket

Aluminum can for catching water displaced by specimen in Overflow Can. With handle.