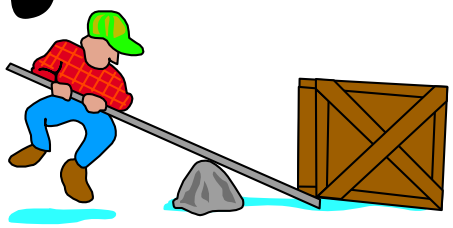
Floating Boxes



Purpose:

1. To create a working model of VOLUME
2. To create a working model of DENSITY

Materials: (per group)

1. Half pint milk carton
2. Half gallon milk or juice carton
3. Rubber band for each carton
4. Metric ruler
5. Birdseeds and straws from Sinking Straws Experiment
6. Deep pan of water (cut off bleach cartons work well)

Procedure:

1. Before students arrive cut off tops of all cartons
2. Review data from sinking straw experiment
3. Have students compare half pint cartons with straws
4. Ask students if they think that it will take the same amount of birdseed to sink the carton as it did to sink the straws in the sinking straws experiment. Have them give reasons for their answers.
5. Have students guess how much mass would be needed to sink the carton to 2 cm.
6. Have students measure and move rubber band so that it measures 2 cm from the bottom of the carton
7. Sink the cartons and record the results. It will take more mass to sink the cartons than it did to sink the straws.
8. Suggest that maybe more than MASS is involved in the sinking of objects. Point out the different sizes of the containers.
9. Introduce VOLUME as the amount of space stuff takes up.
10. Repeat steps 5 through 7using the bigger containers. Record results
11. Share results with class. Have them come up with their own (guided) concept of volume that everyone can agree on.

Results

The bigger the container, the more mass is needed to sink it. The smaller the container the less mass is needed to sink it.

Conclusion

There seems to be another force besides mass that is in play here. Since the straw is thinner than the carton, it doesn't have to push away as much water before it can sink. The carton, being wider, needs more force to overcome the upward push of a larger amount of water. It is almost as if there is a force that is evenly distributing the mass of the birdseed throughout the entire space of the carton. The amount of space an object takes up effects how it sinks, just as the amount of mass you put into it does. The smaller the carton, the less mass is needed to sink it. The larger the carton the more mass is needed to sink it. Scientist call the amount of space something takes up its VOLUME. There seems to be a constant and direct relationship between the mass of an object, its volume, and its ability to sink or float. Scientists call that relationship DENSITY.