Surface Tension I- Floating

Apparatus

container of water, selection of needles and small metal rod, box of matches and small lengths of wood

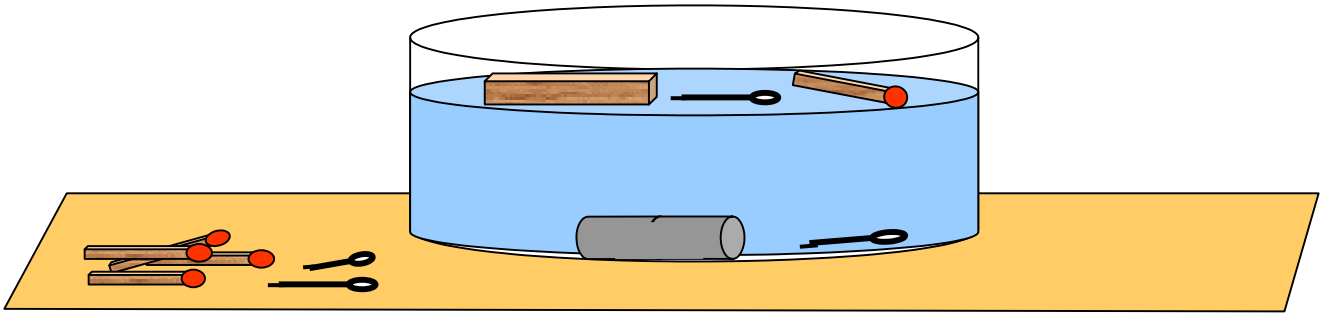
Action

The students experiment with trying to float the needles, matches and lengths of wood and metal. They should try to float both dry and wet needles and matches, and try to explain why dry needles will float, but not wet needles or larger metal objects, while all the wood floats.

The Physics

The wood floats because it is less dense than water and the buoyant force due to the displaced fluid will be greater than the weight force of the wood. Wood floats *in* the water.

Metal is more dense than water and hence will sink. However a needle can be made to float *on* the water if it does not break the surface. The surface of water acts like a stretched skin (trampoline) and the needle sits on it. If the needle is too heavy and the skin cannot support the weight of the needle, the skin ruptures. The skin can also rupture if it is pricked, so if the needle is light enough to be supported by the skin but the skin is pricked in the process of making it float the needle sinks. If the needle is initially wet the water on the needle joins the water in the container and is equivalent to a pricked skin, wet needle will not float.



Accompanying sheet

Surface tension I- Floating

Try to float a needle on the surface of the water.
How do you have to put it in to make it float? Why?

Will it float if it is wet?

Will the larger pieces of metal float?
What about the matchsticks and larger pieces of wood?