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## Special ice cubes

Colored ice cubes are fun. But we can also make other kinds of ice cubes that help things that would normally sink to stay afloat.

### What you'll need

- 1 cork stopper
- a knife
- screws, washers, nuts, tacks, pins, beads...
- a cutting mat or other suitable surface
- a large ice cube tray or several yogurt cartons
- a tall glass full of water
- gummy bears (both with and without gelatin if you would like to do an additional experiment)

### Instructions

- Use the knife to cut the cork stopper into 2 or 3 pieces on the cutting mat (always be very careful when using a knife – please ask your parents for help!)
- Use the cork pieces to make little figures, for instance by using two screws as legs and two shorter screws or pins as arms. Don't forget to give your figure a head, and two tacks for eyes. Be creative! You could give your figure something to wear on its head, add a nut here or there, or draw on a face.
- Now let's see if your figure floats by dropping it into a glass full of water. If it still floats, add a couple more screws or washers to make it heavier.
- Now put the figure in a large ice cube tray or yogurt carton and fill it with water.
- Fill other sections of the tray or yogurt cartons with water and a few screws or washers. Fill one section with water and a gummy bear.
- Put the tray or yogurt cartons in the freezer. Once they have all frozen solid, test each of your special ice cubes in turn to see if they float.

Ask your parents to help you cut the cork stopper!





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**Bonus experiment:** If you like, you can leave the gummy bears in a glass of water for 24 hours and watch what happens. Did you see any difference between the gummy bears with and without gelatin?

### What happens and how does it work?

The figures and gummy bears trapped in ice float. You might find that an ice cube containing washers or screws sinks immediately. As the ice melts, all of the objects eventually sink.

Ice is lighter than water, so it floats. The water particles in ice are arranged in a crystal lattice structure. This means they take up more space than the particles in liquid water. As a result, ice has a lower density, so it floats. In fact, it floats so well that it can hold up objects with a higher density than water, as long as they are trapped inside the ice. After some time, however, even this ice buoy is not enough to keep them afloat. As the ice melts, at some point the heavy screw figures have a greater density than water in spite of the remaining ice, and sink to the bottom of the glass.

### For experts:

The density of a given material is a measure of its mass in relation to its volume.

Imagine a bottle with a volume of 1 liter. It has the capacity to hold a given number of water molecules (or particles) when the water is in liquid form. As the particles in frozen water (ice) are spaced farther apart from each other, fewer particles fit inside the bottle. This makes ice lighter, allowing it to float on liquid water.

However, the ice cubes in our experiment are not pure ice. They have heavier objects trapped inside them. When the overall density of the ice and the object trapped inside it becomes greater than that of liquid water, the object sinks.

