

Science Out Loud.

So if I take this box and just obliterate it in the corner right here and then put it in the water, the weight of the water rushing in will cause the box to sink.

If I take this box and do the same thing, it tips over a little bit, but it still floats.

This box uses the same kind of design that naval architects use to prevent ships 1,000 times bigger from sinking.

What's so special about this box that prevents it from sinking, even with the big hole in its side?

Let's talk about why ships sink in the first place.

You probably know that things will float in water if they're less dense than water and sink if they're more dense.

The metal that this ship is made out of is way more dense than water, so you might think it would sink.

But that metal is shaped so that it traps a lot of air, which is less dense than water, inside it.

So the average density of the hull of the ship is actually much lower than that of water, so the ship floats.

But if the hull springs a leak and fills up with water, there's no more air to lower the average density of the hull, so the ship sinks.

The design of this box basically prevents too much water from getting into it.

This box's hull was divided up into watertight compartments with these walls called bulkheads.

So when I made a hole right here, only this compartment filled up with water.

The rest stayed dry and were able to keep the box afloat.

This box is subdivided, and so is this ship.

Say this ship is divided into ten watertight compartments.

If one area of this ship got damaged, only that compartment would flood, but not any of the others.

The added weight of the water here would cause the ship to tip over a little, to be angled or trimmed in the water, but it wouldn't completely sink, and could still be taken to a port for repairs.

So even with subdivision, why do ships still sink?

Well, it's impractical and expensive to design an unsinkable ship, especially because most of the time, ships just don't see that much damage.

What naval architects do now is try to predict what kind of damage is most likely to happen when designing a ship.

Now, ships are more complicated than this box.

Naval architects have to think about where to subdivide the ship, the shape of the hull, and equipment that goes into the compartments.

We don't know when people first start subdividing ships, but the caps of Chinese trade ships as far back as the fifth century indicate that water would be able to enter the vessel without causing it to sink.

It's pretty crazy that technology that existed so long ago is still being used today.

Hello, I'm Paul.

Thank you for watching Science Out Loud.

For more information, please visit our website.

[LAUGHTER] See what they had me do?