Curiosity Guide #305
Buoyancy

Accompanies Curious Crew, Season 3, Episode 5 (#305)

Bowling Ball Mystery

Investigation #2

Description

What on earth does a bowling ball have to do with buoyancy??

Materials

- 8-pound bowling ball
- 12-pound bowling ball
- 16-pound bowling ball
- Large fish tank
- Water

Procedure

1) Fill a large fish tank with water.
2) Carefully place the 16-pound bowling ball in the tank.
3) What do you notice?
4) If the tank is large enough, add the 8-pound ball. Compare the two balls. If the fish tank is not large enough, remove the heavier ball and view the bowling balls one at a time.
5) What do you notice?
6) Finally, add the 12-pound ball. Observe how it behaves in the water.
7) What do you notice?

My Results

Explanation

Buoyancy is determined by both an object's mass and its volume. The relationship between those two factors is referred to as density. Density = Mass divided by Volume. For example, an object that floats in water, like the 8-pound ball, is said to be positively buoyant because its density is less than the fluid around it. An object that sinks, like the 16-pound ball, is said to be negatively buoyant because its density is greater than the density of the fluid around it. If an object neither floats to the top or sinks to the bottom, but is suspended within a medium, it is said to be neutrally buoyant because the densities of both the object and the fluid are the same. This is what happens with the 12-pound ball.

When an object is immersed in a fluid, either liquid or gaseous, there is always an upward force that works against gravity. This buoyancy force is equal to the weight of the fluid it displaces.

More to think about: Long ago in ancient Greece, there lived a man named Archimedes who was asked by the king to see if the king's crown was really made of solid gold. Archimedes realized that if he submerged the crown in water, the crown would push aside the same volume of water as the volume of the crown. He compared this to a chunk of solid gold, which displaced even more water. Archimedes noticed that each time he placed an object in the water, the water pushed up with a force equal to the weight of the water pushed aside by the object. Archimedes discovered that the crown maker had lied to the king. The crown was not solid gold! In addition, Archimedes also discovered the upward buoyancy force. Way to go!

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