

Cross-Disciplinary

Density and Swim Bladders

Read the following paragraphs, and complete the exercises below.

Density is a physical property of matter. It is a measure of the mass of a substance in a given volume. Density is expressed as grams (g) per cubic centimeter (cm^3). The density of gold is 19.3 g/cm^3 . The density of sodium is 0.97 g/cm^3 . That means that a cube of gold 1 cm on a side would have a mass of 19.3 g. The same size cube of sodium would have a mass of 0.97 g. Water has a density of 1 g/cm^3 . Because less dense substances float on more dense substances, sodium floats on water while gold sinks in water.

DENSITY IN THE SERVICE OF FISH

All animals seek to conserve energy in their daily activities. If you dive into water to explore the bottom, you will have a tendency to rise to the surface because your body is less dense than water. So it takes an expenditure of energy for you to stay at any particular depth in water. Thanks to an adaptation called a swim bladder, bony fish don't have this problem. These fish can pump air between their swim bladder and their blood. As air enters the swim bladder, the density of the fish decreases. As the air leaves, density of the fish increases. The swim bladder automatically adjusts the density of the fish so it equals the density of the water around the fish. This allows the fish to float at any depth, conserving energy.

EXERCISES

1. Describe the concept that defines whether an object will float.

2. How does the swim bladder help a bony fish conserve its energy?

3. Explain why most scuba divers wear belts with varying amounts of lead weights in them.
