



# Vanishing Weight

## (Guide)

### Leading questions:

- Do you think would be easier for the diver to lift the treasure chest when it is under water or above water?

**Explain:** The treasure chest appears to weigh more above the water than below, even though the force of gravity is the same. Ask students to

### What to do:

- Hang a golf ball from the hook on the spring scale.
  - How much does it weigh?
  - Do you think the weight of the ball will increase, decrease, or stay the same if you submerge it in water? Explain why.

**Ask:** Listen to students' predictions and ask them to describe what forces they think are involved in making their predictions.
- Try it. Submerge the golf ball into the water in the cup.
  - How much does the scale say the golf ball weighs now?
  - Why do you think the weight of the ball appears to change?
  - Draw arrows on the forces diagram to show the direction of all of the forces you think are acting on the golf ball.

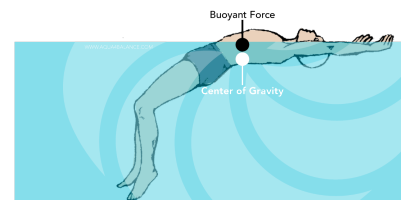
**Explain:** Under water, the buoyant force of water (pushing up) is nearly equal to the force of gravity pulling down; above water the only force acting on the ball is gravity.
- Raise and lower the golf ball into the cup of water several times.
  - Does anything else change when the ball goes below the water surface?

**Explain:** Draw students' attention to the changing water level. Buoyancy is related to the amount of water displaced when the ball is submerged. If the mass of the object is less than the mass of displaced water, the object will float.
- Based on what you have learned, draw arrows on the treasure chest cartoon to represent the forces that you think are acting on the treasure chest.
  - Explain why you think it is easier to carry the treasure when it is under water.

**Explain:** The buoyant force of the water acts against the force of gravity, making the chest appear to weigh less. Above water, the only force acting on the chest is gravity.

### Summary:

The tendency of an object to rise or float in a fluid is called **buoyancy**. The upward force exerted by the fluid is called the **buoyant force**. Buoyant force is related to the amount of **water displaced**.





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## What to do:

1. Hang a golf ball from the hook on the spring scale.
  - How much does it **weigh**?
  - Do you think the **weight** of the ball will increase, decrease, or stay the same if you submerge it in water? Explain why.
2. Try it. Submerge the golf ball into the water in the cup.
  - How much does the scale say the golf ball weighs now?
  - Why do you think the weight of the ball appears to change?
  - Draw arrows on the forces diagram to show the direction of all of the forces you think are acting on the golf ball.
3. Raise and lower the golf ball into the cup of water several times.
  - Does anything else change when the ball goes below the water surface?
4. Based on what you have learned, draw arrows on the treasure chest cartoon to represent the forces that you think are acting on the treasure chest.
  - Explain why you think it is easier to carry the treasure when it is under water.

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