

## 2003 AP<sup>®</sup> PHYSICS B FREE-RESPONSE QUESTIONS

6. (10 points)

A diver descends from a salvage ship to the ocean floor at a depth of 35 m below the surface. The density of ocean water is  $1.025 \times 10^3 \text{ kg/m}^3$ .

- (a) Calculate the gauge pressure on the diver on the ocean floor.
- (b) Calculate the absolute pressure on the diver on the ocean floor.

The diver finds a rectangular aluminum plate having dimensions  $1.0 \text{ m} \times 2.0 \text{ m} \times 0.03 \text{ m}$ . A hoisting cable is lowered from the ship and the diver connects it to the plate. The density of aluminum is  $2.7 \times 10^3 \text{ kg/m}^3$ . Ignore the effects of viscosity.

- (c) Calculate the tension in the cable if it lifts the plate upward at a slow, constant velocity.
- (d) Will the tension in the hoisting cable increase, decrease, or remain the same if the plate accelerates upward at  $0.05 \text{ m/s}^2$ ?

\_\_\_\_\_ increase

\_\_\_\_\_ decrease

\_\_\_\_\_ remain the same

Explain your reasoning.