

CHAPTER 6 PRACTICE PASSAGE

Students are performing experiments in the laboratory using their knowledge of hydrostatics and hydrodynamics.

Experiment 1

Students are given five liquid substances and they are asked to find their densities. They also have a test block that they measure to have a mass of 50 g and a volume of 100 cm³. They place the test block into each liquid and measure how much of the test block is submerged in the water. Table 1 summarizes their results.

Liquid	Volume submerged	Float?
1	80 cm ³	Yes
2	75 cm ³	Yes
3	100 cm ³	No
4	50 cm ³	Yes
5	100 cm ³	Yes

Table 1 Test block placed in different liquids

Experiment 2

The students are given four different complex objects that all have the same density. They place each object in a test liquid that has a specific gravity of 2. They record the submerged volume of the object by the measuring the displacement of the water. Their results are summarized in Table 2.

Object	Volume of displaced liquid
A	150 cm ³
B	90 cm ³
C	75 cm ³
D	110 cm ³

Table 2 Complex objects in a test liquid

Experiment 3

Students must create an irrigation system that takes water from a reservoir 80 cm deep to a wave pool across the room. A perfectly leveled, horizontal tube with constant circumference takes water from the bottom of the reservoir to the wave pool.

1. From Experiment 1, which liquid has the smallest density?

- A) Liquid 4
- B) Liquid 3
- C) Liquid 5
- D) Liquids 3 and 5

2. What is the specific gravity of Liquid 1?

- A) 7/2
- B) 5/8
- C) 8/5
- D) 2/7

3. What is the buoyant force acting on the test block in Liquid 5?

- A) 2500 N
- B) 500 N
- C) 5 N
- D) 0.5 N

4. Which object from Experiment 2 has the largest mass?

- A) Object A
- B) Object B
- C) Object C
- D) Object D

5. If the tubing used in Experiment 3 has a cross-sectional area of 0.02 m², what is the velocity of the water as it enters the wave pool?

- A) 2 m/s
- B) 3 m/s
- C) 4 m/s
- D) 5 m/s

6. If the students wanted to increase the speed of the water exiting the tubing in Experiment 3, they could:

- I. increase the diameter of the tubing at both ends.
- II. decrease the diameter of the tube at the wave pool.
- III. add more water to the reservoir.

- A) II only
- B) III only
- C) II and III only
- D) I, II and III

7. Two objects made from the same material with the same mass are placed in a liquid, base first. The base of Object 2 is three times that of Object 1. What best describes the buoyant force on the objects?

- A) Object 1 has a greater buoyant force acting on it because it has a larger volume submerged.
- B) Object 2 has a greater buoyant force acting on it because it has a larger volume submerged.
- C) Object 2 has a greater buoyant force acting on it because it has a larger area at its base.
- D) The buoyant force acting on both objects is the same.