Forces in Fluids • Chapter Test

Forces in Fluids

Multiple Choice
Write the letter of the correct answer on the line at the left.

____ 1. Which of the following is NOT the SI unit of pressure?
   a. N/m²  b. Pa  c. newton  d. pascal

____ 2. Pressure is
   a. force ÷ area.  b. area ÷ force.  c. force + area.  d. force ÷ area.

____ 3. At higher elevations, air pressure is
   a. less because there is less air above.  b. greater because there is more air below.  c. less because gravity is stronger.  d. less because the air is moving faster.

____ 4. When pressure is applied to a confined fluid, the increase in pressure is transmitted equally to all parts of the fluid. This fact is called

____ 5. An object under water feels lighter than it does in air because of
   a. air pressure.  b. buoyancy.  c. fluid speed.  d. temperature.

____ 6. An object is dropped into a beaker containing a liquid. The object drops to the bottom of the beaker. Therefore, the
   a. density of the object is greater than the density of the liquid.  b. density of the object is less than the density of the liquid.  c. mass of the object is less than the mass of the liquid.  d. volume of the liquid displaced is more than the volume of the object.

____ 7. If you blow a stream of air between two balloons that are next to each other, the balloons
   a. rise.  b. move away from each other.  c. move toward each other.  d. move randomly.

____ 8. Air above an airplane wing is moving faster than air below an airplane wing. This causes the plane to
   a. accelerate.  b. slow down.  c. increase its elevation.  d. decrease its elevation.
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9. Fluids exert pressure because they are made up of tiny
   a. moving molecules that exert forces.
   b. forces that sum together.
   c. molecules that push upward.
   d. particles that are buoyant.

10. Bubbles rise in water because they are
    a. so tiny.
    b. less dense than water.
    c. more dense than water.
    d. fluids.

Completion

Fill in the line to complete each statement

11. The flow of smoke up a chimney is explained by ________________ principle.
12. A device that increases force that works because of Pascal’s principle, such as the braking system of a car, is called a ________________ device.
13. The density of a substance is its ________________ per unit volume.
14. The outward pressure exerted by a fluid decreases as the speed of the fluid ________________.
15. The pressure exerted by the gas in Earth’s atmosphere is called ________________.

True or False

Determine whether each statement is true or false. If it is true, write true. If it is false, change the underlined word or words to make the statement true.

16. A fluid is a substance whose volume can easily change.
17. Water pressure increases as depth increases.
18. The buoyant force always acts in an upward direction.
19. Archimedes’ principle states that the buoyant force on an object is equal to the force of the fluid displaced by the object.
20. The density of an object would be changed by changing the object’s volume or its area.
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Chapter Test

Using Science Skills: Interpreting Diagrams

Use the diagram below to answer the following questions. Answer the questions in the spaces provided or on a separate sheet of paper.

21. Calculating  What is the pressure exerted by the left piston? What is the pressure being exerted on the right piston?
________________________________________________________________________

22. Explain  What is the force exerted on the right piston?
________________________________________________________________________

Essay

On a separate sheet of paper, write a brief paragraph to answer each of the following

23. Explain how an airplane’s wing helps an airplane fly. What principle explains this?

24. How must the average density of a helium balloon be changed to make it rise, float at a constant level, and sink in air?

25. Explain why ice floats in water using the term buoyant force. What must be the density of ice compared to water?
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Using Science Skills: Interpreting Diagrams
Use the diagram below to answer the following questions. Answer the questions in the spaces provided or on a separate sheet or paper.

26. Interpreting Diagrams  All three steel boats weigh the same and float carrying the same weight. Apply Archimedes’ principle and compare the water displaced by each. Which will be the first to hit bottom as they enter shallow water? Explain.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

27. Critical Thinking  If a boat identical in shape to boat C were made from a less dense material than steel, would the boat float higher or lower in the water? Explain.

________________________________________________________________________
________________________________________________________________________

Essay
On a separate sheet of paper, discuss each of the following statements in a brief paragraph.
28. How does a hydraulic system work to increase force? What principle does it depend on?
29. How could you determine your mass using water, a bathtub, something to measure water with, and Archimedes’ principle?
30. Imagine that you are sitting in a parked car by the highway. Use the properties of moving fluids to explain the forces that act on your car if another car speeds by very close to your car. (Hint: A moving car pushes air ahead of it and tends to pull air along with it because of friction.)