Exercises

19.1 Liquid Pressure (pages 363–365)

1. Define pressure in words.

_____

_____

2. What is the equation for pressure?_____

3. What three factors determine the pressure of a liquid?

_____

4. Is the following sentence true or false? How much a liquid weighs, and thus how much pressure it exerts, depends on its density. _____

5. Consider two identical containers, one filled with a dense liquid and the other filled to the same depth with a less dense liquid. Which container exerts more pressure?

_____

_____

6. Circle the letter of each statement that is true.

a. The pressure of a liquid at rest does not depend on the shape of the container or the size of its bottom.

b. The pressure due to liquid = density $\times g \times$ depth.

c. At a given depth, a liquid exerts more pressure on the bottom of its container.

d. The total pressure of a liquid is: density $\times g \times$ depth *plus* the pressure of the atmosphere.

7. Is the following sentence true or false? The pressure of a liquid depends on the amount of liquid._____

8. One dam holds back the water from a large, but shallow lake. Another dam holds back the water from a small, but deep lake. Which dam must withstand the greater pressure?

_____

_____

9. What principle about liquid and pressure do Pascal's vases demonstrate?

_____

_____

_____

_____

19.2 Buoyancy (pages 366–367)

10. The _____ is the net upward force exerted by a fluid on a submerged or immersed object.

Match each sentence with the correct result.

_____ **11.** The weight of a submerged object is greater than the buoyant force.

_____ **12.** The weight of a submerged object is less than the buoyant force.

_____ **13.** The weight of a submerged object is equal to the buoyant force.

a. The object will remain at any level.

b. The object will sink.

c. The object will float on the surface.

14. How much liquid does a completely submerged object displace?

_____

15. Describe a method of determining the volume of an irregularly shaped object.

_____

_____

_____

19.3 Archimedes' Principle (pages 367–368)

16. What does Archimedes' principle state?

_____

_____

17. What does *immersed* mean?

_____

_____

18. Is the following sentence true or false? An immersed container will displace the same volume of water and the same weight of water at any depth._____

19. Explain the relationship between the upward force due to water pressure on the bottom of a submerged block and the downward force due to water pressure on the top of the submerged block.

_____

_____

19.4 Does It Sink, or Does It Float? (pages 369–370)

20. A submerged object's _____ determines the buoyant force.

21. When the buoyant force equals the weight of an object completely submerged in water, then the object's weight must equal

_____.

Match each phrase with the correct word or words.

_____ **22.** An object will sink.

_____ **23.** An object will float.

_____ **24.** An object neither sinks nor floats.

a. An object has a density equal to the density of the fluid in which it is immersed.

b. An object is more dense than the fluid in which it is immersed.

c. An object is less dense than the fluid in which it is immersed.

25. Why does a submarine take in or release water from its ballast tanks?

_____

26. How do fish and crocodiles control their density?

_____

_____

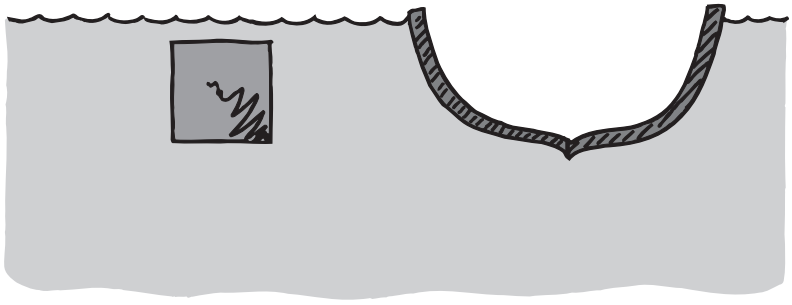
_____

19.5 Flotation (pages 371–372)

27. Explain why in the figure below, the iron block on the left sinks, while the reshaped piece of iron on the right floats.

_____

_____



28. Is the following statement true or false? The principle of flotation states that a floating object displaces a weight of fluid equal to its own volume._____

29. Every ship must be designed to displace a weight of water equal to

_____

19.6 Pascal's Principle (pages 373–374)

30. What does Pascal's principle state?

_____

_____

_____

31. Circle the letter of each statement that is true.

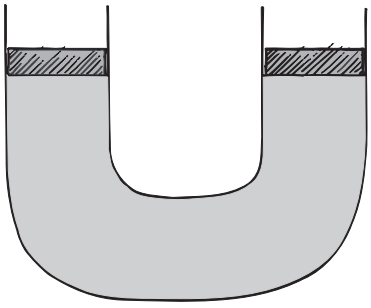
a. Pascal's principle was discovered in the seventeenth century.

b. The SI unit for pressure is named after Pascal.

c. The SI unit for force is named after Pascal.

d. Pascal's principle is employed in a hydraulic press.

Use the figure below to answer Questions 32–34.



32. If pressure is applied to the left piston, what happens to the pressure on the right piston?

_____

33. If pressure is applied to the left piston, is there any point in the enclosed fluid where the pressure is greater?

_____

_____

34. In a hydraulic press, the surface area of the smaller piston is 1 cm^2 and the surface area of the large piston is 50 cm^2. What is the force on the larger piston if 1 N/cm^2 of pressure is applied to the smaller piston?

_____

35. Explain why energy is conserved in a hydraulic press even though force is multiplied.

_____

_____

_____

36. Is the following statement true or false? Pascal's principle applies to liquids and gases._____

37. Explain how an automobile lift works.

_____

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