

Chapter 10

When atmospheric pressure increases, what happens to the absolute pressure at the bottom of a pool?

- A) It does not change
- B) It increases by an amount less than the atmospheric change.
- C) It increases by an amount equal to the atmospheric change.
- D) It increases by an amount greater than the atmospheric change.
- E) It decreases

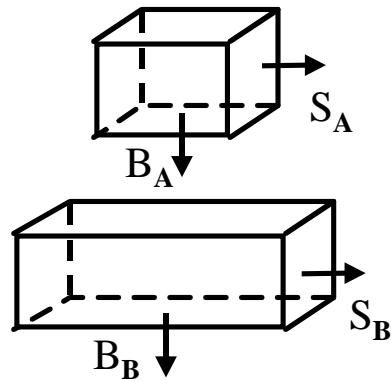
Three drinking glasses all have the same area base and are all filled to the same level. Glass A is cylindrical. Glass B is larger at the top and holds more water. Glass C is smaller at the top and holds less water. Which glass has the greatest liquid pressure at the bottom?

- A) Glass A
- B) Glass B
- C) Glass C
- D) All have the same pressure

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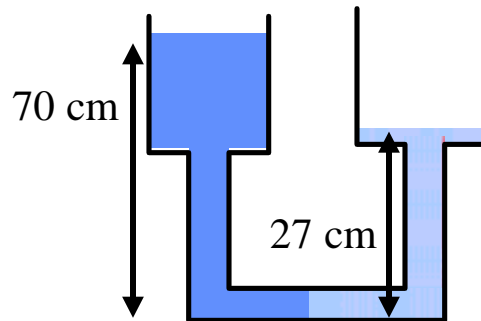
Consider two fish tanks that are the same height and the same width. Tank **A** is 3 feet long and tank **B** is 6 feet long. S_A is the force on the side of tank **A**, and S_B is force on the side of tank **B**. B_A is the force on the bottom of tank **A**, and B_B is force on the bottom of tank **B**. Which statement below is true?

- A) $S_A = S_B$ and $B_A = B_B$
- B) $S_A = 2S_B$ and $B_A = B_B$
- C) $2S_A = S_B$ and $2B_A = B_B$
- D) $S_A = S_B$ and $2B_A = B_B$
- E) $S_A = 2S_B$ and $B_A = 2B_B$



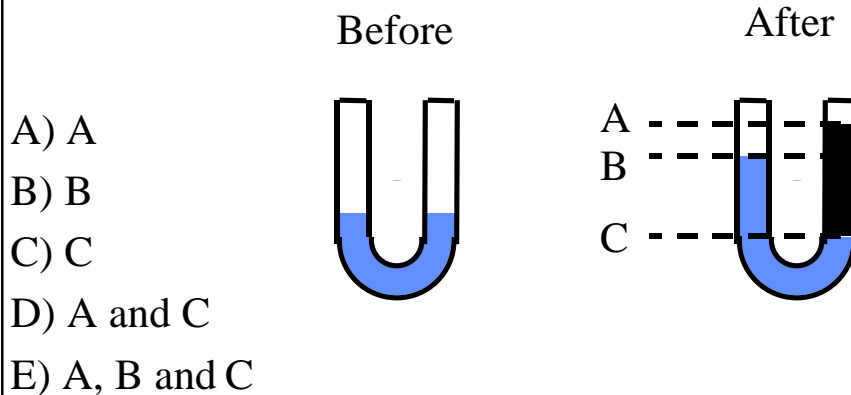
A column of water 70 cm high supports a column of an unknown liquid as shown in the figure. Assume that both liquids are at rest and that the density of water is 1000 kg/m^3 . (Neglect the small difference in air pressure at the top of the two liquids). What is the density of the unknown liquid?

- A) 1000 kg/m^3
- B) $(27/70)(1000 \text{ kg/m}^3)$
- C) $(70/27)(1000 \text{ kg/m}^3)$
- D) $(27/70)/(1000 \text{ kg/m}^3)$
- E) None of the above

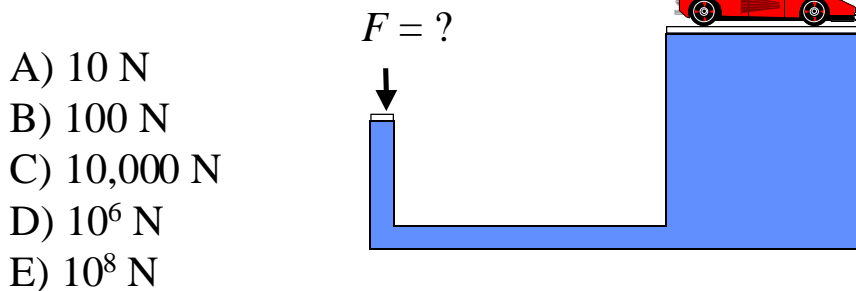


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A U-shaped tube is open at both ends and filled with water. Oil is then poured into the right arm and forms a column of liquid as shown in the figure on the right. At what height is the pressure in the right arm equal to the pressure in the left arm?



A container filled with oil is fitted with pistons on both ends. The area of the left piston is 10 mm^2 and that of the right piston is $10,000^2 \text{ mm}^2$. What force must be exerted on the left piston to move the 10,000 N car upward at a constant velocity?



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50 cm³ of wood is floating on water, and 50 cm³ of iron is totally submerged. Which has the greater buoyant force on it?

- A) The wood.
- B) The iron.
- C) Both have the same buoyant force.
- D) It is impossible to tell from the information given.

A 10 kg piece of aluminum sits at the bottom of a lake, right next to a 10 kg piece of lead. Which has the greater buoyant force on it? (Aluminum is less dense than lead).

- A) The aluminum
- B) The lead
- C) Both have the same buoyant force
- D) It is impossible to determine without knowing their volumes.

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An object floats with half its volume beneath the surface of the water. The weight of the displaced water is 2000 N. What is the weight of the object?

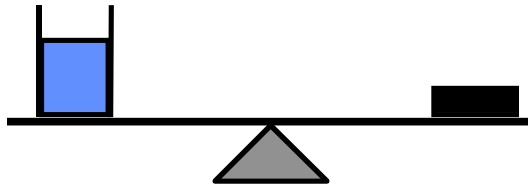
- A) 1000 N
- B) 2000 N
- C) 4000 N
- D) Impossible to determine without more information.

Salt water is more dense than fresh water. A ship floats in both fresh water and salt water. Would the ship displace a larger amount of fresh water, salt water or neither?

- A) Fresh water
- B) Salt water
- C) Neither
- D) Cannot be determined from the information given.

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A beaker of water is sitting on a balanced scale. If you put your finger in the water without touching any surface of the beaker, what happens to the side of the scale with the beaker on it?



- A) It goes down
- B) It goes up
- C) It stays in the same place

A boat carrying a large boulder is floating on a lake. The boulder is thrown overboard and sinks. The water level in the lake, with respect to the shore

- A) rises.
- B) drops.
- C) remains the same.

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A piece of wood is floating in a bathtub. A second piece of wood sits on top of the first piece, and does not touch the water. If the top piece is taken off and placed in the water, what happens to the water level in the tub?

- A) It goes up
- B) It goes down
- C) It stays the same
- D) It depends on whether the two pieces of wood are the same kind of wood and have the same density.

Consider an object that floats in water but sinks in oil. When the object floats in water, half of it is submerged. If we slowly pour oil on top of the water so it completely covers the object, the object

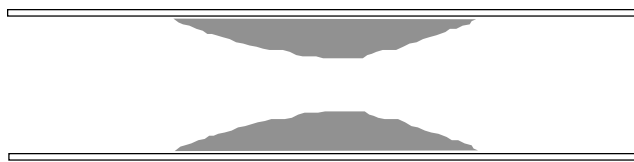
- A) moves up.
- B) stays in the same place.
- C) moves down.

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Water enters a pipe of radius r with a certain velocity. The water encounters a location in the pipe where its velocity is increased to 4 times its initial velocity. What is the diameter of this portion of the pipe?

- A) $r/16$ cm
- B) $r/4$ cm
- C) $r/2$ cm
- D) $2r$ cm
- E) $4r$ cm

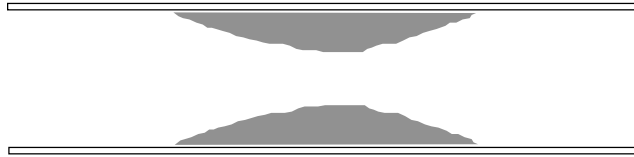
Blood flows through a coronary artery that is partially blocked by deposits along the artery wall. Through which part of the artery is the flow rate (flux) largest?



- A) The narrow part
- B) The wide part
- C) The flow rate is the same in both parts

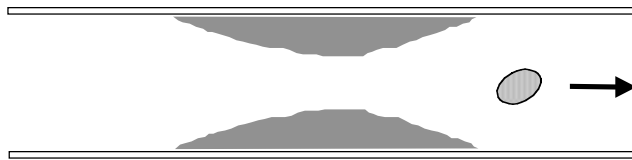
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Blood flows through a coronary artery that is partially blocked by deposits along the artery wall. Through which part of the artery is the flow speed largest?



- A) The narrow part
- B) The wide part
- C) The speed is the same in both parts

A blood platelet drifts along with the flow of blood through an artery that is partially blocked by deposits. As the platelet moves from the narrow region to the wider region, it experiences?

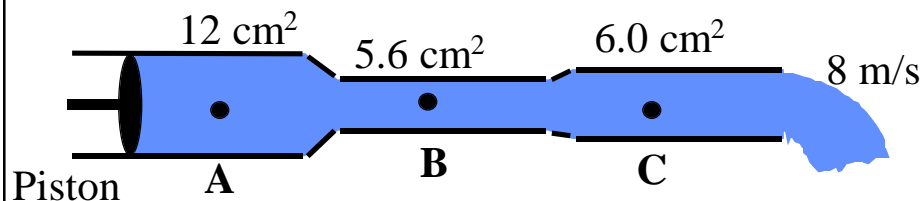


- A) an increase in pressure.
- B) no change in pressure.
- C) a decrease in pressure.

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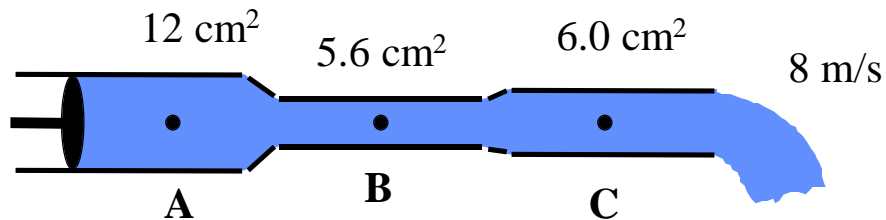
The next three questions all have to do with the following situation:

A glass tube has three different cross sectional areas with the values indicated in the figure below. A piston at the left exerts pressure so the mercury in the tube flows out the right end with a speed of 8 m/s.



Atmospheric Pressure is $1.01 \times 10^5 \text{ N/m}^2$

Density of Mercury is $13,600 \text{ kg/m}^3$



Atmospheric Pressure = $1.01 \times 10^5 \text{ N/m}^2$

Density of Mercury = $13,600 \text{ kg/m}^3$

At what speed is mercury flowing past the point labeled A?

A) 2 m/s

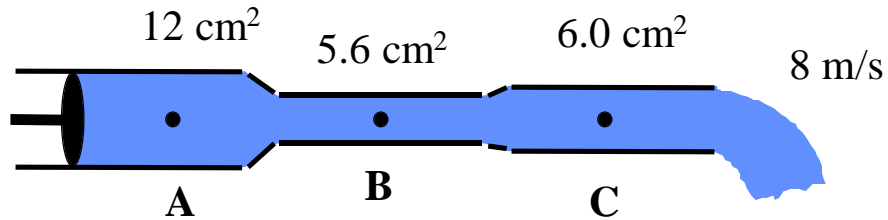
C) 8 m/s

E) 16 m/s

B) 4 m/s

D) 12 m/s

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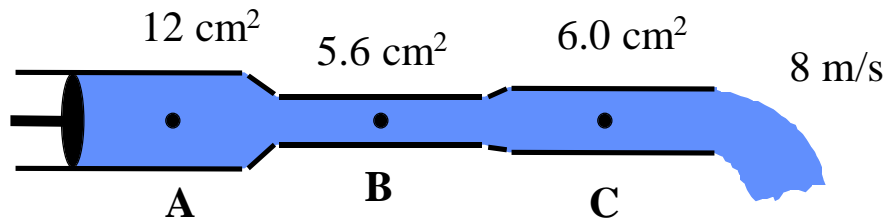


Atmospheric Pressure = $1.01 \times 10^5 \text{ N/m}^2$

Density of Mercury = $13,600 \text{ kg/m}^3$

What is the total pressure at point C?

- A) $1.01 \times 10^5 \text{ N/m}^2$
- B) $3.26 \times 10^5 \text{ N/m}^2$
- C) $3.66 \times 10^5 \text{ N/m}^2$
- D) $6.44 \times 10^5 \text{ N/m}^2$
- E) $7.45 \times 10^5 \text{ N/m}^2$



Atmospheric Pressure = $1.01 \times 10^5 \text{ N/m}^2$

Density of Mercury = $13,600 \text{ kg/m}^3$

What is the total pressure at point A?

- A) $1.01 \times 10^5 \text{ N/m}^2$
- B) $2.02 \times 10^5 \text{ N/m}^2$
- C) $2.25 \times 10^5 \text{ N/m}^2$
- D) $3.26 \times 10^5 \text{ N/m}^2$
- E) $4.27 \times 10^5 \text{ N/m}^2$

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When a tube of diameter d is placed in water, the water rises to a height h . If the diameter were half as great, how high would the water rise?

- A) $h/2$
- B) h
- C) $2h$
- D) $4h$
- E) Not enough information to know.

Two Styrofoam balls, of radii R and $2R$, are released simultaneously from a tall tower. Which will reach the ground first? Do not neglect air resistance, and assume the air flow is laminar.

- A) The large one
- B) The small one
- C) Both will reach the ground simultaneously
- D) It depends on the atmospheric pressure