Fluids HW - Bernoulli's Equation

This is a preview of the draft version of the quiz

Started: Nov 4 at 9:27am

Quiz Instructions

Question 1 — 1 pts

Higher velocity means _____ pressure and lower velocity means _____ pressure.

- lower, higher
- higher, lower
- changing, constant
- constant, changing

Question 2 — 1 pts

In several cases, you see differences in pressure on an object being discussed as forces that create things like lift or buoyancy. Which of the following best explains why that is?

- pressure is the amount of force on an object per unit of area

- pressure is a type of force and shares the same units of measurement
- pressure is not a force but change in pressure is a force
- pressure is the name used to describe force specifically in fluids

Question 3

1 pts

Propyl alcohol flows through a pipe from point A to point B. The pressure at point A is atmospheric. The pressure at point B is 0.25atm. Point B is 2.0m higher than point A. The velocity at point A is 10m/s. The density of propyl alcohol is 803 kg/m3.

What is the velocity at point B in m/s?

Question 4

1 pts

Propyl alcohol flows through a pipe from point A to point B. The pressure at point A is atmospheric. The pressure at point B is 0.25 atm. Point B is 2.0 m higher than point A. The velocity at point A is 10 m/s. The density of propyl alcohol is 803 kg/m3.

What is the diameter of pipe in m at point B if the flow rate is 3 m^3/s?

Question 5

1 pts

At a local dairy farm, large enclosed tanks are used to store milk after its been pasteurized and before it's bottled. The tanks are depressurized to 1000Pa to reduce the amount of oxygen in the tank so that unwanted microbes don't proliferate. The farm has a specialist on staff that goes and checks the chemical composition of the milk in each tank every so often. She draws a sample of milk from a valve on the bottom of the tank.

The height of milk in the tank when a sample is drawn is always 10m. The density of milk is 1030kg/m3. The diameter of the sampling line is 0.25cm.

What speed in m/s does the milk flow out of the sampling line when the valve is open?

Patm=101,325Pa for this problem.

Question 6

1 pts

Which of the following are false?

- [ ] Bernoulli's Equation applies to compressible gasses.
- [ ] Bernoulli's principle gives that the pressure increases as velocity increases.

- [ ] Bernoulli's equation can be used to analyze hydrostatic fluids.
- [ ] Blowing air between two sheets of paper forces them together.

Question 7

1 pts

A family builds a house on top of a mountain. They build a 10cm diameter pipe all the way up the mountain to pump city water from the main water pipe to their house. The water in the pipe ascends 1,000m before spilling out into a tank at atmospheric pressure.

What is the pressure in the pipe at the bottom of the mountain in kPa?

Question 8

1 pts

A family builds a house on top of a mountain. They build a 10cm diameter pipe all the way up the mountain to pump city water from the main water pipe to their house. The water in the pipe ascends 1,000m before spilling out into a tank at atmospheric pressure.

The tank can hold 1,000 m^3 and is currently 1/4 full. Water is being drawn from the bottom of the tank to be used around the house at 6 m^3/min. How long in minutes will it take to fill up the tank at the original flow in rate of 10 m^3/min?

Question 9

1 pts

Bernoulli's principle is based on conservation of-

- energy
- mass
- volume
- momentum
- pressure
- velocity

Question 10

1 pts

A water tower on a New York City roof begins leaking. The height of the water in the tower is initially 10m and the diameter is large enough to assume that the velocity of the water at the top of the tower is zero when the leak starts.

Assuming the top of the tank is open to the atmoshpere, what is the velocity in m/s through the hole?

Question 11

1 pts

My shower head contains 100 holes 0.5cm in diameter. Water flows from my hot/cold valves up a 6cm diameter pipe 2.5m long to my shower head. I would like the gauge pressure of water just before it comes out of my shower head to be 300kPa and the velocity to be 3m/s. What should the gague pressure at my valves be in kPa? The density of water is 1000kg/m3.

Question 12

1 pts

A hydroelectric dam holds back a river. When the turbines fail, emergency valves are opened, diverting flow straight out through large pipes open to the atmosphere to be dumped into the river below so that the river above doesn't flood. The depth of the river from surface to the emergency pipes' exit is 20m. The velocity at the surface of the river is negligible. The flow rate of the river should be maintained at 250,000 Liter/min to prevent upstream flooding.

What is the velocity of water flowing out of the emergency pipes in m/s?

Question 13

1 pts

A hydroelectric dam holds back a river. When the turbines fail, emergency valves are opened, diverting flow straight out through large pipes open to the atmosphere to be dumped into the river below so that the river above doesn't flood. The depth of the river from surface to the emergency pipes' exit is 20m. The velocity at the surface of the river is negligible. The flow rate of the river should be maintained at 250,000 Liter/min to prevent upstream flooding.

If six emergency pipes are going to be installed, what diameter pipe should be used in meters?

Question 14

1 pts

In the year 79 C.E., Mount Vesuvius famously erupted and decimated the Roman city of Pompeii, spewing molten rock at a mass rate of 1.5 metric tons per second. Prior to erupting, the volcano was 5 km tall from base to tip. The column of molten lava stretched approximately 10 km down from the base of the volcano to the magma reservoir . The specific gravity of magma is 2.6. The pressure at the magma reservoir is 390 MPa. Atmospheric Pressure is 101,325 Pa.

Using Bernoulli's Equation, what is the velocity in m/s of the erupting magma just after exiting the volcano?

Question 15

1 pts

In the year 79 C.E., Mount Vesuvius famously erupted and decimated the Roman city of Pompeii, spewing molten rock at a mass rate of 1.5 metric tons per second. Prior to erupting, the volcano was 5 km tall from base to tip. The column of molten lava stretched approximately 10 km down from the base of the volcano to the magma reservoir . The specific gravity of magma is 2.6. The pressure at the magma reservoir is 390 MPa. Atmospheric Pressure is 101,325 Pa.

Determine the diameter in meters of the volcano's orifice during eruption.

Question 16

1 pts

In the year 79 C.E., Mount Vesuvius famously erupted and decimated the Roman city of Pompeii, spewing molten rock at a mass rate of 1.5 metric tons per second. Prior to erupting, the volcano was 5 km tall from base to tip. The column of molten lava stretched approximately 10 km down from the base of the volcano to the magma reservoir . The specific gravity of magma is 2.6. The pressure at the magma reservoir is 390 MPa. Atmospheric Pressure is 101,325 Pa.

If the mass flow rate were quadruple the rate described above, how would the diameter of the volcano change?

- The diameter would double.
- The diameter would halve.
- The diameter would be quartered.
- The diameter would also quadruple.

- The diameter would stay the same.

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