Question 1
The speed of glycerin flowing in a 5.0 cm i.d. pipe is 0.54 m/s. Find the fluid's speed in a 3.0 cm i.d. pipe that connects with it, both pipes flowing full.

A) 1.5 m/s
B) 0.9 m/s
C) 0.19 m/s
D) 0.32 m/s

Question 2
A large open tank of non-viscous liquid springs a leak 4.5 m below the top of the liquid. What is the theoretical velocity of outflow from the hole? If the area of the hole is 0.25cm^2, how much liquid would escape in exactly 1 minute?

A) (a) 9.4 m/s, (b) 0.0141 m^3
B) (a) 88.3 m/s, (b) 0.000235 m^3
C) (a) 3.0 m/s, (b) 2540 m^3
D) (a) 4.7 m/s, (b) .846 m^3

Question 3
A pipe of varying inner diameter carries water. At point 1 the diameter is 20 cm and the pressure is 130 kPa. At point 2, which is 4.0 m higher than point 1, the diameter is 30 cm. If the flow is 0.080 m^3/s, what is the pressure at the second point?

A) 93 kPa
B) 91 kPa
C) 133 kPa
D) 39 kPa

Question 4
A container is filled with gas at a pressure of 4.0 x 105 Pa. The container is a cube, 0.10 m on a side, with one side facing south. What is the magnitude and direction of the force on the south side of the container due to the gas inside?

A) 2.0 kN southward
B) 4.0 kN northward
C) 2.0 kN northward
D) 4.0 kN southward

Question 5
A certain town receives its water directly from a water tower. If the top of the water in the tower is 26.0 m above the water faucet in a house, what should the gauge pressure of the water at the faucet be? (Neglect the effects of other water users.)

A) 0.255 kPa
B) 255 kPa
C) 2.65 kPa
D) 127 kPa

Question 6

At a height of 10 km (33000 ft) above sea level, atmospheric pressure is about 210 mm of mercury. What is the resultant normal force on a 600 cm^2 window of an airplane flying at this height? Assume the pressure inside the plane is 760 mm of mercury. The density of mercury is 13 600 kg/m^3.

A) 6.1 kN
B) 4.4 x 104 kN
C) 1.2 x 103 kN
D) 4.4 kN

Question 7
A glass tube is bent into the form of a U. A 50.0 cm height of olive oil in one arm is found to balance 46.0 cm of water in the other. What is the density of the olive oil?

A) 920 kg/m3
B) 1090 kg/m3
C) 230 kg/m3
D) 0.920 kg/m3

Question 8
On a day when the pressure of the atmosphere is 1.000 x 105 Pa, a chemist distills a liquid under slightly reduced pressure. The pressure within the distillation chamber is read by an oil-filled manometer (density of oil = 0.78 g/cm^3). The difference in heights on the two sides of the manometer is 27 cm. What is the pressure in the distillation chamber?

A) 98 kPa
B) 2.1 kPa
C) 1.021 x 105 Pa
D) 211 Pa

Question 9
A metal cube, 2.00 cm on each side, has a density of 6600 kg/m^3. Find its apparent mass when it is totally submerged in water.

A) 0.439 g
B) 8.01 g
C) 11.2 g
D) 44.8 g

Question 10
A solid piece of aluminum (r=2.70 g/cm^3) has a mass of 8.35 g when measured in air. If it is hung from a thread and submerged in a vat of oil (r=0.75 g/cm^3), what will be the tension in the thread?

A) 0.059 N
B) 0.082 N
C) 0.023 N
D) 0.105 N