1. Which of the following are the SI units for specific gravity?
   A) kg/m³
   B) g/cm³
   C) lb/ft³
   D) lb · s²/ft⁴
   E) Specific gravity has no units.

2. A penny has a mass of 3.0 g, a diameter of 1.9 cm, and a thickness of 0.15 cm. What is the density of the metal of which it is made?
   A) 1.8 g/cm³
   B) 3.4 g/cm³
   C) 3.5 g/cm³
   D) 7.1 g/cm³
   E) 4.5 g/cm³

3. What is the gauge pressure at a depth of 6 cm in a glass filled with 4 cm of mercury and 4 cm of water? Water has a density of 1000 kg/m³, and mercury has a density 13.6 times as great.
   A) 3.1 kPa
   B) 5.6 kPa
   C) 5.8 kPa
   D) 310 kPa
   E) 560 kPa
4. Your blood pressure is reported as 50 mm of Hg. The density of mercury is 13.6 g/cm$^3$. Your pressure is equivalent to
A) $6.7 \times 10^6$ Pa.
B) 6.8 Pa.
C) $6.8 \times 10^2$ Pa.
D) $6.7 \times 10^3$ Pa.
E) $3.2 \times 10^2$ Pa.

5. According to Pascal's principle, the pressure at every point in a confined liquid
A) depends only on the density of the liquid.
B) is equal to the weight of the liquid.
C) is the same.
D) is changed the same amount by an externally applied pressure.
E) is equal to the externally applied pressure.

6. You are floating in a boat in a swimming pool. There are some large stones, with a density of 2.5 g/cm$^3$, in the boat. You throw the stones out of the boat and they sink to the bottom of the pool. The water level $h$, measured vertically at the end of the pool __________ as the stones are thrown out.
A) decreases
B) increases
C) There is not enough information to solve the problem.
D) stays the same
E) None of these is correct.

7. A block of wood of mass 300 g and density 0.75 g/cm$^3$ is floating on the surface of a liquid of density 1.1 g/cm$^3$. What mass of lead (density = 11.3 g/cm$^3$) must be added to the block in order for the combination just to be submerged?
A) 440 g
B) 820 g
C) 140 g
D) 155 g
E) None of the above
8. An air-conditioning system is designed to fill a room of $10 \, \text{m} \times 8 \, \text{m} \times 6 \, \text{m}$ with fresh air every 20 minutes. If the circular air duct has a diameter of 13 cm, calculate the speed of airflow in the duct.

A) None of the answers below
B) 450 m/s
C) 2.4 m/s
D) 7.5 m/s
E) 1.0 m/s

9. Cities across the United States supply freshwater to the residents at constant pressure by the use of water towers. If the diameter, $d_2$, of the pipe coming out of the tower is 25 cm, and the diameter, $d_1$, of the pipe at your home is 2.0 cm, what is the ratio of the velocity of the water at $d_1$ compared with $d_2$? Assume that all the taps are off except yours.

A) 12.5
B) 156
C) 0.0064
D) 0.08
E) 25

10. A particle moving with a simple harmonic motion has its maximum displacement of +18 cm at time $t = 0$. The frequency of the motion is $10 \, \text{s}^{-1}$. At a time $t = 0.65 \, \text{s}$, the position of the particle is

A) +18 cm.
B) zero.
C) −13 cm.
D) −18 cm.
E) +7.3 cm.

11. A particle with a mass of 65 g is moving with simple harmonic motion. At time $t = 0$, the particle is at its extreme positive displacement of 18.0 cm. The period of the motion is $0.600 \, \text{s}$. At time $t = 1.35 \, \text{s}$, the velocity of the particle is

A) −1.9 m/s.
B) zero.
C) 0.84 m/s.
D) +1.9 m/s.
E) −0.84 m/s.
12. A rocket ship is propelled vertically up with an acceleration of $g$ in a uniform gravitational field. A pendulum of length 1.0 m would have a period of
A) 0.
B) 2.0 s.
C) 1.41 s.
D) 3.1 s.
E) The period is infinite.
Answer Key

1. E  
2. D  
3. A  
4. D  
5. D  
6. A  
7. D  
8. D  
9. B  
10. D  
11. A  
12. B