CHAPTER 6 FREESTANDING PRACTICE QUESTIONS

1. Which of the following is true?

A) Compression in length increases with an increased area of applied force.
B) Compression in length increases with decreased applied force.
C) Compression in length is larger with a smaller original length.
D) Compression in length is larger with a smaller Young's modulus.

2. A person is leaning on his elbow on a table. If the amount of force the table must exert to keep the person upright is F, the area of contact between the person and the table is A, and the angle that the person's arm makes with the table's surface is θ, how much pressure is exerted by the person on the table?

A) $\frac{F}{A}$
B) $\frac{F\sin\theta}{A}$
C) $\frac{F\cos\theta}{A}$
D) Since the force exerted by the person on the table is not given, the pressure exerted by the person on the table cannot be determined.

3. What is the maximum weight of an object that a 50 kg person could lift by standing on one piston of a hydraulic jack, if the jack's pistons are circular and have radii of 5 m and 10 m?

A) 500 N
B) 1000 N
C) 2000 N
D) 4000 N

4. If the blood in the body is taken to be an ideal liquid, which of the following is true of blood flow in arteries?

A) The flow speed of blood is the same through the complete peripheral vascular system at any given moment, but it varies over time.
B) The flow speed of blood is the same through the complete peripheral vascular system and does not vary over time.
C) The flow rate of blood is the same through the complete peripheral vascular system at any given moment, but it varies over time.
D) The flow rate of blood is the same through the complete peripheral vascular system and does not vary over time.

5. If the density of a person is approximately the density of water and the density of air is approximately 1 kg/m^3, how many times greater is the weight of the person than the buoyant force from the air on the person?

A) 10
B) 100
C) 1000
D) 10000

6. Will an object with more mass but the same volume as another object sink faster in a non-viscous fluid?

A) No, because acceleration due to gravity is independent of the mass of the object being accelerated.
B) No, because the buoyant force is greater on an object with more mass.
C) Yes, because it weighs more, and the weight itself induces greater acceleration for the heavier object than for the lighter.
D) Yes, because the buoyant force impedes the downward acceleration of a greater mass less than it does a lesser mass.

7. A particular eucalyptus tree has a density of 667 kg/m^3 and a mass of 6000 kg. What volume of the tree would float above the surface of water?

A) 3 m^3
B) 5 m^3
C) 6 m^3
D) 9 m^3