

Test #: A

Name:

Perm #:

Section (10-11 or 12-1):

You **MUST** put the **TEST #** in the first answer bubble.

The TA will explain.

YOU MUST do this or the test will not be graded.

**WRITE ALL YOUR CALCULATIONS IN THE BLUEBOOK
PUT YOUR NAME AND THE TEST IN THE BLUEBOOK AND HAND IN**

1. Which of the following is the mass density of a material? (11-1)
 - A) The material's weight per unit volume
 - B) The material's mass per unit volume
 - C) The material's specific gravity
 - D) The material's volume per unit weight
 - E) The material's volume per unit mass

2. A block of material has a density ρ . A second block of equal volume has three times the mass of the first. What is the density of the second block? (11-4)
 - A) ρ
 - B) 3ρ
 - C) $\rho/3$
 - D) 9ρ
 - E) $\rho/9$

3. A glass is filled with water. The gauge pressure at the top of the glass is zero, and the gauge pressure at the bottom is P . A second glass with three times the height and twice the diameter is also filled with water. What is the pressure at the bottom of the second glass?
 - A) P
 - B) $2P$
 - C) $3P$
 - D) $3P/2$
 - E) $3P/4$

4. At what depth in seawater is the gauge pressure equal to 1 atm? The density of seawater is $1.03 \times 10^3 \text{ kg/m}^3$.
- A) 5 m
 - B) 7.5 m
 - C) 10 m
 - D) 15 m
 - E) 20 m
5. A ball bearing that has a density of 5.16 g/cm^3 is held at rest under the surface of a liquid that has a density of 2.50 g/cm^3 . The magnitude of the acceleration of the ball bearing just after it is released is
- A) 5.0 m/s^2 .
 - B) 14 m/s^2 .
 - C) 10 m/s^2 .
 - D) 6.5 m/s^2 .
 - E) 1.6 m/s^2 .
6. Two objects with different volumes have the same apparent weight when submerged in water. If they are placed in a vacuum,
- A) both weigh less than before.
 - B) the one with the smaller volume weighs less than the other.
 - C) the one with the smaller volume weighs more than the other.
 - D) they weigh the same.
 - E) both weigh more than before.
7. A rock is thrown into a swimming pool that is filled with water at a uniform temperature. Which of the following statements is TRUE?
- A) The buoyant force on the rock is zero as it sinks.
 - B) The buoyant force on the rock increases as it sinks.
 - C) The buoyant force on the rock decreases as it sinks.
 - D) The buoyant force on the rock is constant as it sinks.
 - E) The buoyant force on the rock as it sinks is nonzero at first but becomes zero once the terminal velocity is reached.

8. Water from a tap is flowing at a uniform rate of $24 \text{ cm}^3/\text{s}$ into a cylindrical container. An exit tube is mounted on the side of the container at height $h/2$ from the base. The height h of the water remains constant. The volume flow at which the water leaves the container is
- A) $12 \text{ cm}^3/\text{s}$.
 - B) $24 \text{ cm}^3/\text{s}$.
 - C) $36 \text{ cm}^3/\text{s}$.
 - D) $48 \text{ cm}^3/\text{s}$.
 - E) $72 \text{ cm}^3/\text{s}$.
9. A horizontal pipe narrows from a diameter of 10 to 5 cm. For a non-viscous fluid flowing from the larger diameter to the smaller,
- A) the velocity and pressure both increase.
 - B) the velocity increases and the pressure decreases.
 - C) the velocity decreases and the pressure increases.
 - D) the velocity and pressure both decrease.
 - E) either the velocity or the pressure changes but not both.
10. A hurricane-strength wind is blowing at a speed of 100 km/hr over a flat roof of 100 m^2 . Assuming the inside of the house to be at 1 atm pressure and the density of air is 1.3 kg/m^3 , calculate the pressure difference between the inside and the outside of the roof.
- A) 500 Pa lower outside
 - B) 1000 Pa higher outside
 - C) 500 Pa lower inside
 - D) 1000 Pa lower outside
 - E) 18 Pa lower outside
11. Any body moving with simple harmonic motion is being acted on by a force that is
- A) constant.
 - B) proportional to a sine or cosine function of the displacement.
 - C) proportional to the inverse square of the displacement.
 - D) directly proportional to the displacement.
 - E) proportional to the square of the displacement.

12. The equation for the period T of a mass m oscillating with simple harmonic motion at the end of a spring with a force constant k is $T = 2\pi\sqrt{m/k}$. A mass m that is oscillating on a spring with a force constant of 0.52 N/m has a period of 2.1 s. On a second spring, the same mass has a period of 3.5 s. The force constant of the second spring is
- A) impossible to determine because the mass is not given.
 - B) 0.19 N/m.
 - C) 1.4 N/m.
 - D) 0.31 N/m.
 - E) 0.75 N/m.
13. A 2.50-kg object is attached to a spring of force constant $k = 4.50$ kN/m. The spring is stretched 10.0 cm from equilibrium and released. What is the maximum kinetic energy of this system?
- A) 45.0 J
 - B) 22.5 J
 - C) 56.0 J
 - D) 2.25×10^5 J
 - E) 4.50 J

Answer Key

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