Part 1: ***(1 point each)***

Use g = 10 m/s^2.

1. Ahmad is walking at **1.63 *m/s***. If Ahmad weighs **583 *N***, what is the magnitude of his momentum?

(a) 95.0 kg · m/s (c) 68.6 kg · m/s (e) 953 kg · m/s (b) 358 kg · m/s
(d) 672 kg · m/s

2. A projectile is launched with **200 *kg · m/s*** of momentum and **1000 *J*** of kinetic energy. What is the mass of the projectile?

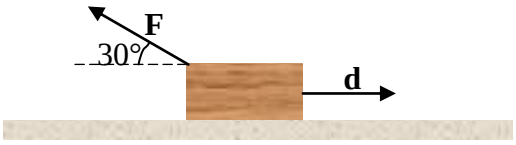
(a) 5 kg (c) 20 kg (e) 50 kg (b) 10 kg
(d) 40 kg

3. Complete the following statement: Momentum will be conserved in a two-body collision *only if*

(a) both bodies come to rest.
(b) the collision is perfectly elastic.
(c) the kinetic energy of the system is conserved.
(d) the net external force acting on the two-body system is zero.
(e) the collision is perfectly inelastic.

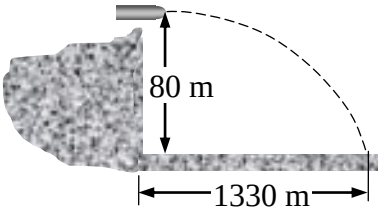
4. A constant force of **25 N** is applied as shown to a block which undergoes a displacement of **7.5 m** to the right along a frictionless surface while the force acts. What is the work done by the force?

(a) zero joules (c) –94 J
(e) –163 J (b) +94 J
(d) +163 J



5. A shell is fired with a horizontal velocity in the positive ***x*** direction from the top of an **80-m** high cliff. The shell strikes the ground **1330 m** from the base of the cliff as shown. Determine the initial speed of the shell.

(a) 4.0 m/s (c) 82 m/s
(e) 330 m/s (b) 9.8 m/s
(d) 170 m/s



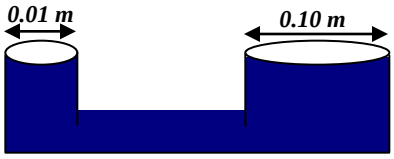
6. The density of mercury is **1.36×10^4 kg/m^3**. What is the mass of a **4.00×10^{-4}-m^3** sample of mercury?

(a) 0.0343 kg (c) 2.94 kg (e) 6.29 kg (b) 0.00294 kg
(d) 5.44 kg

7. How much force does the **atmosphere** exert on one side of a vertical wall **4.00-m** high and **10.0-m** long? **Note**: Atmospheric pressure is **1.013×10^5 Pa**.

(a) 2.53×10^3 N (c) 4.05×10^5 N (e) zero N (b) 1.01×10^5 N
(d) 4.05×10^6 N

8. A force of **250 N** is applied to a hydraulic jack piston that is **0.01 m** in **diameter**. If the piston that supports the load has a **diameter** of **0.10 m**, approximately how much mass can be lifted by the jack? Ignore any difference in height between the pistons.

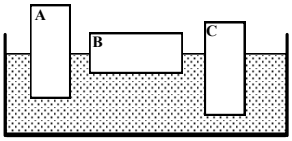


(a) 255 kg (c) 800 kg (e) 6300 kg (b) 500 kg
(d) 2500 kg

9. Which one of the following statements concerning the buoyant force on an object submerged in a liquid is true?

(a) The buoyant force depends on the mass of the object.
(b) The buoyant force depends on the weight of the object.
(c) The buoyant force is independent of the density of the liquid.
(d) The buoyant force depends on the volume of the liquid displaced.
(e) The buoyant force will increase with depth if the liquid is incompressible.

10. Three blocks, labeled **A, B**, and **C**, are floating in water as shown in the drawing. Blocks **A** and **B** have the **same mass and volume**. Block **C** has the **same volume**, but is submerged to a greater depth than the other two blocks. Which one of the following statements concerning this situation is **false**?



(a) The density of block A is less than that of block C.
(b) The buoyant force acting on block A is equal to that acting on block B.
(c) The volume of water displaced by block C is greater than that displaced by block B.
(d) The buoyant force acting on block C is greater than that acting on block B.
(e) The volume of water displaced by block A is greater than that displaced by block B.

11. Water flows through a pipe of **diameter 8.0 cm** with a speed of **10.0 m/s**. It then enters a smaller pipe of **diameter 3.0 cm**. What is the speed of the water as it flows through the smaller pipe?

(a) 1.4 m/s (c) 27 m/s (e) 71 m/s (b) 2.8 m/s
(d) 54 m/s

End of Part 1.

<u>Part 2:</u> For the following problems, please show your work in the space provided to receive partial credit. ***(2 points each)***

P. 1. A tennis ball is thrown from ground level with an initial velocity of $\boldsymbol{v_i}$ directed **30°** above the horizontal. If it takes the ball **1.0 s** to reach the top of its trajectory ***(the maximum height)***, what is the magnitude of the initial velocity? ***(Hint: Draw a schematic for the problem.)***

Answer:_____(with units)

P. 2. The head of a hammer (***m* = 1.5 kg**) moving at **4.5 m/s** strikes a nail and bounces back with the same speed after an elastic collision lasting **0.075 s**. What is the average force (magnitude and direction) the hammer exerts on the nail?

Answer:_____(with units)

P.3. When a block of volume $\mathbf{1.00 \times 10^{-3}\ m^3}$ is hung from a spring scale as shown in **Figure A**, the scale reads **10.0 N**. The density of water (ρ_{Water}) is $\mathbf{1000\ kg/m^3 = 1.00 \times 10^3\ kg/m^3}$. What is the mass of the object?
***(Hint:** Draw a Free Body Diagram for the Block and show the forces acting on the block in the water).*

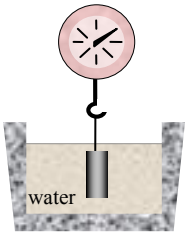


Figure A

Answer:_____(with units)

Good Luck