Multiple choice questions Part I. Each question is worth 2 points. Select the answer(s)
which best satisfies the question.

1) Two boxes are located on a 5.0 m long board, the right-side box at the far right end,
and the left-side box is 3.0 m away from the box on the right. The fulcrum of the
board is in the middle and the system is balanced. Find the torque provided by the
left box if the right-side box mass is 30 kg and the other box has mass 15 kg.

2) You are shopping at Kroger at 2 am for a late-night snack. In your rectangular-
shaped shopping carry basket of length 0.80 m, at one end are three 0.15 kg cans
of soup. Where should you place a 0.45 kg box of saltine crackers in the basket
such that the center of gravity of the dry goods is at the center of your basket?

3) Say your faithful canine companion Baxter is sitting on a park bench of length 1.5
meters and weight 500 N. Assume the park bench is supported at each end and
the support force at the left end is 1.5 times than that at the right end. How much
does my dog weigh?

4) An object with kinetic energy 20 J has mass 40 kg and spins with \( \omega = \frac{5}{s} \text{ rad} \).
What is the angular momentum, L, of this object?

5) Washer One has a shear modulus one-fifth that of Washer Two. This indicates
that Washer One:
a) has a smaller elastic limit than Washer Two.
b) has a different molecular structure than Washer Two.
c) has a smaller cross-sectional area than Washer Two.
d) has a larger radius than Washer Two.
e) both choices B and C are valid.

6) A fiberglass kayak floats in the ocean ( \( \rho = 1.03 \times 10^3 \frac{\text{kg}}{\text{m}^3} \) ). Its area is 2.0 m²
and is 0.008 m below the ocean surface. What is the mass of this kayak?

7) The speed of an ideal fluid through the left end of a pipe of radius 1 in is 20 \( \frac{\text{m}}{\text{s}} \).
If the speed of this fluid out the right end of the pipe is 5 times that of the inflow
velocity, then what factor smaller is the right end pipe radius to the left end?

8) Kepler's law states \( T^2 = kr^3 \), and consider time and distance to be measured in
units such that \( k = 1 \). This law can only be applied to objects orbiting the Sun,
and \( r \) is in terms of the Earth's distance to the Sun. What is the mean radius factor
(as compared to Earth) of a planetary body orbiting the Sun if it takes the object
8.0 years to orbit the Sun?
a) 3 times that of Earth's distance to the Sun.
b) 4 times that of Earth's distance to the Sun.
c) 5 times that of Earth's distance to the Sun.
d) 6 times that of Earth's distance to the Sun.
9) A car moving with speed $40 \frac{m}{s}$ and weighing 1500 kg hits another car traveling the opposite direction at $25 \frac{m}{s}$. Consider a perfectly inelastic collision occurs. Then what is the mass of the second car?

10) With pressure being held constant, and the molar quantity of gas unchanged, suppose the volume of gas increases twelve-fold. What initial temperature was the gas if the final temperature is increased by a factor of five?