Key terms to choose from for Questions 1 and 2:

A. Newton’s Law of universal gravitation                     I. potential energy
B. G                                                         J. gravitational potential energy
C. linear momentum                                            K. energy
D. torque                                                    L. joule
E. angular momentum                                          M. law of conservation of linear momentum
F. work
G. kinetic energy
H. law of conservation of angular momentum

1. (2 points) Fill in the letter that best fits each of the following statements.
   a. \( G \) the energy of motion
   b. \( L \) a unit of energy

2. (2 points) Write the letter corresponding to a key term from above that best matches each description below.
   a. \( K \) the ability to do work
   b. \( F \) a process for transferring energy

3. (2 points) Circle the best answer for each of the following multiple choice questions.
   a. Which of the following objects has the greatest kinetic energy?
      i) a mass of \( m \) with a velocity of \( 4v \)
      ii) a mass of \( 4m \) with a velocity of \( v \)
      iii) a mass of \( 3m \) with a velocity of \( 2v \)
      iv) \textbf{a mass of} \( 2m \) \textbf{with a velocity of} \( 3v \)
   b. Gravitational potential energy depends on which of the following?
      i) mass
      ii) acceleration due to gravity
      iii) height
      iv) all of the above

\( \leftrightarrow \text{O V E R} \rightarrow \)
4. (2 points) Fill in the blanks below.
   
a. Mechanical energy consists of kinetic energy and **potential** energy.

b. The unit N·m is given the special name of **Joule**.

5. (2 points) The equation for the gravitational attraction between two bodies is given by:

   \[ F = \frac{Gm_1m_2}{r^2} \]

   a. If the radius between two objects is tripled, by what factor does the gravitational force change (be specific – doubled, quadrupled, cut in half, etc.)?

   *Since the distance between the two objects is tripled, the force will decrease by a factor of \(3^2 = 9\)*

   b. If the mass of one object is quadrupled and the distance between the two objects is decreased by a factor of 10, by what factor does the gravitational force change (be specific – doubled, quadrupled, cut in half, etc.)?

   *Since the mass of one object increases by a factor of 4, the force increases by a factor of 4 due to that change. Since the distance becomes 10 times smaller, the force increases by a factor of 10\(\) Since the mass of one object increases by a factor of 4, the force increases by a factor of 4 due to that change. Since the distance becomes 10 times smaller, the force increases by another factor of \(10^2 = 100\). Overall, the force increases by a factor of \(4 \times 100 = 400\).*

Potentially useful formulas:

\[ E_k = \frac{1}{2} mv^2 \quad E_p = mgh \]