Final Exam **Unit 2B – Chapters 7 and 8 (Momentum + Energy)**

[2.1.C.a] Compare the momentum of two objects in terms of mass and velocity.
[2.2.C.b] Explain that the total momentum remains constant within a system.
[1.2.B.a,b,c,d] Mechanical energy comes from motion and/or relative position of an object.

Chapter 7: Pages 86 – 99 *TEXTBOOK (Conceptual Physics; Paul G. Hewitt)*
Chapter 8: Pages 103 – 118 *TEXTBOOK (Conceptual Physics; Paul G. Hewitt)*

Define the following terms:

1. Momentum (7.1)
2. Impulse (7.2)
3. Work (8.1)
4. Energy (8.3)
5. Power (8.2)

Answer the following questions:

1. Which one has more mass: A rolling skateboard or a dump truck at rest? Explain…
2. Which one has more momentum: A rolling skateboard or a dump truck at rest? Explain…
3. What is the momentum of an 8-kg bowling ball rolling at 2 m/s?
4. What is the momentum of a 50-kg carton that slides across an icy surface at 4 m/s?
5. A 2-kg blob of clay moving at 3 m/s slams into a 2-kg blob of clay at rest. Calculate the resulting speed.
6. In terms of impulse and momentum, why are air bags in automobiles a good idea?

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7. Which requires more work: Lifting a 10-kg barbell 2 meters or a 5-kg barbell 4 meters? Explain…

8. How much power is necessary to do 100 J of work on an object in 0.5 seconds? 1 second?

9. Suppose an automobile has 2000 J of kinetic energy. When it moves twice the speed, what will be its kinetic energy? Three times the speed?

10. Calculate the kinetic energy of a 3-kg toy cart that moves at 4 m/s. Double its speed and recalculate.

11. Calculate the potential energy of 8 million kilograms of water dropping 50 meters over Niagara Falls.

12. If an elephant and a mouse run with the same amount of kinetic energy, which animal is running faster? Explain in terms of the equation for kinetic energy.

13. State two reasons why a rock projected by a sling shot will go faster if the rubber is stretched an extra distance.

14. Does an object with momentum always have energy? Explain…

15. Does an object with energy always have momentum? Explain…