Final Exam **Unit 1B – Chapter 2 and 3 (Vertical Motion + Projectiles)**

[2.2.B.a] Describe gravity as an attractive force among all objects.
[2.2.B.b] Recognize all free falling bodies accelerate at the same rate due to gravity regardless of their mass.
[2.2.E.c] Predict the path of an object when the net force changes.

Chapter 2: Pages 10 – 24 *TEXTBOOK (Conceptual Physics; Paul G. Hewitt)*
Chapter 3: Pages 28 – 39 *TEXTBOOK (Conceptual Physics; Paul G. Hewitt)*

Define the following terms:

1. Free Fall (2.5)
2. Projectile (3.4)
3. Resultant (3.2)
4. Scalar quantity (3.1)
5. Vector quantity (3.1)

Answer the following questions:

1. What is the instantaneous speed of a freely falling object at the end of 5 seconds of fall?
2. What is the acceleration of a freely falling object at the end of 5 seconds of fall?
3. What is the distance fallen for a freely falling object at the end of 5 seconds of fall?
4. An object is dropped off a cliff on a planet that has double Earth gravity. What is the instantaneous speed, acceleration and distance fallen for the freely falling object at the end of 5 seconds?
5. A ball is thrown straight up at 25 m/s. How long will it take to reach zero speed? How long will it take to return to the starting point? How fast will it be going when it returns?

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6. How does a vector quantity differ from a scalar quantity?

7. If a vector is 1 cm long and represents 10 km/h, what velocity does a 2 cm line represent?

8. If a cannonball is launched horizontally at the same time another cannonball is dropped off a cliff, which cannonball will hit the ground first? Explain why…

9. Calculate the resultant velocity of an airplane that flies at 200 km/h and encounters a 50 km/h tailwind. Calculate the resultant velocity of the airplane if the tailwind became a headwind.

10. A cannonball is launched horizontally off a 25 meter cliff at a speed of 37.2 m/s. Calculate the distance that cannonball traveled.

11. A cannonball is launched horizontally off a 75 meter cliff over a distance of 143 meters. Calculate the launch speed of the cannonball.

12. A boat is rowed at 8 km/h directly across a river that flows at 6 km/h. What is the resultant speed of the boat?