Physics 20

Chapter 1 Worksheet

Answer the following questions on a separate sheet. Make sure to follow all rules for setting up a question, sig digs, and scientific notation when appropriate.

1. **Illustrate** two examples of *scalar* measurements, and two examples of *vector* measurements. **Explain** why scalar and vector are different.

2. **Explain** if the speedometer on a car shows average or instantaneous velocity.

3. You see Jackie Chan walking down the street and decide to check his reflexes. You fling your pet hedgehog, Phil, 4.7m North towards him. Jackie easily catches Phil, screams in pain, and throws him 7.8m South. **Determine** the distance and displacement that Phil has traveled. *(12.5m, 3.1m [S])*

Illustration 1: Phil the Hedgehog.

4. You're pushing a toy car along a ramp that is 3.0m long. **Determine** the velocity of the car if it takes you 4.58s to push it along this ramp. Give your final answer in m/s and km/h. *(0.66m/s = 2.4km/h)*

5. **Sketch** a displacement – time graph that shows the motion of an object as it...
   a) starts at rest,
   b) begins to speed up in the positive direction,
   c) and ends up traveling forwards at a constant velocity.

6. **Explain** how you could determine the displacement of an object from a velocity-time graph.

7. You are traveling down the highway at 110 km/h when you notice a turn up ahead that you will need to slow down for. You apply the brakes, which you know causes an acceleration of $2.15 m/s^2$, for 6.8s. **Determine** your final velocity. *(16m/s)*

8. The International Pickle Rolling Championships will once again be in our city, so you decided to go into training and try out. In training you have been able to get the pickle to go from 2.5m/s up to 6.9m/s over a distance of 21.7m. **Determine** how much time this takes you to do. *(4.6s)*

9. During landings the Space Shuttle used fins on the back of its tail as "speed brakes" to help the brakes on the landing gear to slow down the Shuttle. In training, the pilots practised doing a landing where the brakes on the landing gear had failed and only the speed brakes on the tail were working. If the shuttle touched down at 315 km/h and came to rest on a runway that was 6.4 km long, **determine** the acceleration needed from the speed brakes. *($-0.60 m/s^2$)*

10. You have gone up to the top of the Empire State Building and start throwing pennies down to the street level (you heard something about this on Mythbusters once). As the police drag you away, you do some quick math in your head. If you had thrown the pennies down from the observation deck 321m above street level at an initial velocity of 1.99m/s, **determine** their speed as they reach the ground. *(79.4m/s)*

11. The second generation Tesla Roadster claims to be the highest acceleration of any production car. It can accelerate from zero to 97 km/h (they test it as 60 miles per hour) in just 1.9s. **Determine** how many gees a driver would feel, and **explain** the significance of this acceleration as they sit in a seat in the car. (*1.4 gees*)