

# Chapter 1 Worksheet

Answer the following questions on a separate sheet. Make sure to follow all rules for setting up a question, sig figs, 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]*)
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  $2.15\text{m/s}^2$ , 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 a landing, the Space Shuttle uses 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 pilot will practice doing a landing where the brakes on the landing gear have failed and only the speed brakes on the tail are working. If the shuttle touches down at 315 km/h and must come to rest on a runway that is 6.4 km long, **determine** the acceleration needed from the speed brakes. (*-0.60m/s<sup>2</sup>*)
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*)



*Illustration 1: Phil the Hedgehog.*