

## Post-Activity Worksheet **Answer Key**

A robot called Nemo has 2.5-inch wheels and a robot named Wall-E has 3.5-inch wheels. The motors of both robots have the same RPM (revolutions per minute). Both robots drive forward for 1 minute.

1. Which of the following is true?
  - a. Wall-E will go farther than Nemo.**
  - b. Nemo will go farther than Wall-E.
  - c. Both travel the same distance.
2. Which robot will have a greater linear velocity?
  - a. Wall-E**
  - b. Nemo
  - c. Both have the same linear velocity.
3. Which robot will have a greater angular velocity?
  - a. Wall-E
  - b. Nemo
  - c. Both have the same angular velocity.**

For the following questions, the robots have the same wheel diameter as above (2.5-in for Nemo and 3.5-in for Wall-E).

4. Wall-E is driving with an angular velocity of 20 radians/sec. Calculate Wall-E's linear velocity.

$$v = \omega r \quad \omega = \frac{20 \text{ rad}}{\text{sec}} \quad r = \frac{3.5 \text{ in}}{2}$$

$$v = \frac{20 \text{ rad}}{1 \text{ sec}} \cdot 1.75 \text{ in} = \frac{35 \text{ in}}{\text{sec}}$$

5. Nemo is driving with an angular velocity of 20 radians/sec. Calculate Nemo's linear velocity.

$$v = \omega r \quad \omega = \frac{20 \text{ rad}}{\text{sec}} \quad r = \frac{2.5 \text{ in}}{2}$$

$$v = \frac{20 \text{ rad}}{1 \text{ sec}} \cdot 1.25 \text{ in} = \frac{25 \text{ in}}{\text{sec}}$$

6. You want Wall-E and Nemo to end up at the same location. Given their respective wheel sizes, describe how Wall-E and Nemo can drive to end up at the same location.
 

**Wall-E could drive for a shorter time than Nemo drives. Wall-E will get there first, but they will end up in the same location. –OR- If Wall-E drives with fewer RPM (or a smaller angular velocity) than NEMO does, then they arrive at the same location and at the same time.**
7. *Think outside of the box!* Why do different vehicles—tractors, trucks, sports cars and SUVs—have different wheel sizes? What wheel size would you want on your vehicle and why?
 

**Answers will vary (for example: different cars have different wheel sizes so that different speeds can be attained, depending on the performance characteristics required of the car type).**