

## Friction Force Data Sheet **ANSWER KEY**

| Surface Combinations          | Time              |
|-------------------------------|-------------------|
| Rubber tire on tile           | <b>27 seconds</b> |
| Without rubber tire on tile   | <b>25 seconds</b> |
| Rubber tire on carpet         | <b>32 seconds</b> |
| Without rubber tire on carpet | <b>30 seconds</b> |

### Data Table ↑ and Analysis Questions ↓

1. Which wheel set-up and surface combination caused the robot to take the longest time to complete the 10 foot race? Explain why.

**The wheel set-up with the rubber tires on carpet took the longest time because both tires and carpet are rough. The rougher the materials, the more friction force. The more friction force, the more force acting against the motion of the robot and slowing the robot down.**

2. Which wheel set-up and surface combination caused the robot to take the least time to complete the 10 foot race? Explain why.

**The wheel set-up without rubber tire on tile took the least time because these surfaces are very slippery and have minimal frictional force opposing the motion of the robot and the trailer.**

3. If wheels do not have rubber tires, as in the case in our activity, would you consider the surface of the wheels to be slippery or rough? Can you make an educated guess on why car tires use rubber tires?

**Wheels without rubber tires are a slippery surface. Car tires need rubber so that the wheels do not slip, especially when the car is driving on wet, icy or snowy roads. Rubber tires generate good traction so the wheels roll, instead of slip, on the road.**

4. According to your observations, which pair of surfaces showed best traction? Please explain why.

**The slowest trial was the one with the wheels with rubber tires on carpet. This combination was the slowest is because these rough surfaces in contact created the most friction force. Friction force that causes two surfaces to “stick” together is called traction. Therefore, the wheel set-up with rubber wheels on carpet showed the best traction.**

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

5. In the space below, create a bar graph with the surface combinations on the x-axis and the time to complete the course on the y-axis.

