Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Lesson 5: How Does Acceleration Affect Vehicle Wear?**A truck is a complex machine. Both cars and trucks have many moving parts. These parts can wear out due to friction. Can the way a person drives affect how long the parts on a truck last? Put yourself in gear and start this investigation.

Here are some definitions to help you in your investigation.

Interaction - a way one thing affects another thing

Force - any push or pull on an object that results in an interaction with another object

Friction - a force that opposes the motion of an object

Speed - how fast something is moving

Acceleration - speeding up, slowing down, or changing the direction of an object

**Doing the Science**

1. Select the Sim tab to open the Acceleration simulation.

2. Select the gray truck on the left side of the screen by clicking on the truck.

3. Select a speed of 20 m/s.

4. Allow a couple of seconds for the truck to reach a constant speed. A box appears when the truck reaches a constant speed.

5. Choose an acceleration value of “2 m/s2.” Allow the simulation to run.

6. Select the “Display Data” option. Click on the “Wear” graph tab.

7. Note and record in Table 1 the system wear of the truck.

8. Select the “Restart” option.

9. Choose the truck and the same speed as you did before.

10. Choose an acceleration value of 4 m/s2. Allow the simulation to run.

11. Select the “Display Data” option. Click on the “Wear” graph tab.

12. Note and record in Table 1 the system wear of the truck.

13. Select the “Restart” option.

14. Repeat steps 9–13 only using an acceleration of 6 m/s2.

15. Repeat steps 9-13 using accelerations of -2 m/s2, -4 m/s2, and -6 m/s2.

**Table 1.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Trial** | **Speed (m/s)** | **Acceleration (m/s2)** | **System Wear** |
| 1 | 20 | 2 |  |
| 2 | 20 | 4 |  |
| 3 | 20 | 6 |  |
| 4 | 20 | -2 |  |
| 5 | 20 | -4 |  |
| 6 | 20 | -6 |  |

**Do You Understand?**

1. What happened when the truck had negative (-) accelerations as in trials 4 - 6?

2. How are system wear and acceleration related?

3. List two ways a person can reduce the wear of truck parts while driving.