

## Brakes and Braking Systems

### [[YELLOW BAR (DESCRIPTION OF SESSION)]]

Explorers will be introduced to the basics of automobile brakes and braking systems.

### CATEGORY

- Auto Technology
- Brakes

### OBJECTIVES

By the end of this session, participants will be able to:

- Explain how braking systems work.
- Check the brake fluid and operating condition of a vehicle's brakes.
- Replace brake pads.

### SUPPLIES

- Activity 1
  - One smooth metal washer, one craft stick or small piece of wood, one small piece of cloth (such as a shop rag), and a pair of pliers for each pair of Explorers
- Activity 2
  - Proper safety equipment for each participant (i.e., eye and ear protection, gloves)
  - A demonstration vehicle
  - Brake pads, brake fluid, and other parts or fluids needed to perform routine brake maintenance
  - Tools as needed to perform routine brake maintenance

**ADVISOR NOTE:** Text in italics should be read aloud to participants. As you engage your post in activities each week, please include comments, discussions, and feedback to the group relating to **Character, Leadership, and Ethics**. These are important attributes that make a difference in the success of youth in the workplace and in life.

### ACTIVITIES

#### Activity 1

##### Miniature Tug-of-War

This activity is intended to get your Explorers engaged and to serve as a lead-in to the main event.

Have your Explorers divide up into pairs. Give each twosome a pair of pliers, a smooth washer, a craft stick or other small piece of wood, and a small piece of cloth.

Have each pair grasp the washer using only their thumb and forefinger and on your signal have them engage in a "tug-of-war." After one person wins, have them repeat the exercise with the craft stick and then with the cloth.

Repeat the entire sequence once more except this time allow one of the players to use the pliers instead of their fingers.

## **Activity 2**

### **Main Event**

Begin the main event by asking the following questions:

- *What was it about the winners of the tug-of-war that made it easier for them?*
- *Were some materials (metal, wood, or cloth) easier to hold on to than others? Which ones?*
- *What difference did the pliers make?*

Try to guide the discussion toward the conclusion that friction, as demonstrated by the resistance between the different materials and their skin, and pressure, as demonstrated by the gripping power of the pliers, determined the effectiveness of each player's ability to win. This is similar to the effectiveness of brakes on a vehicle. The nature and quality of the brake pads, along with the pressure applied, will determine the stopping power.

It is important that your Explorers learn by doing. Make sure that this meeting is full of hands-on experiences as the Explorers learn about automobile braking systems.

Based upon the interests of the post (such as vintage car restoration or modern vehicle maintenance), engage in a short explanation of the different types of braking systems. It is likely you will simply be focusing on the standard disc brake system, but a discussion on drums or pneumatics may also be appropriate.

Have a demonstration vehicle available to work on.

Explain, demonstrate, and then allow each Explorer to do the following:

- Check brake fluid level
- Inspect brake lines
- Inspect the brake calipers
- Remove old brake pads and install new ones
- Inspect the rotors for excessive wear

As each part is inspected or worked on, discuss its function within the braking system. Explain how the use of hydraulics multiplies the amount of pressure applied by the pads.

### **ADVISOR NOTE**

Some sample questions are below. They are designed to help the participants apply what they have learned to their own interests. You are welcome to use these questions or develop your own questions that relate to your post or specific focus area.

### **REFLECTION**

Focusing Questions

- *What did you learn about how brakes work that you didn't know before?*
- *How is the braking system more or less complicated than you imagined?*

#### Analysis Questions

- *What effect could trapped dirt have on the effectiveness of the braking system?*
- *How could snow removal chemicals shorten the life of your brakes?*

#### Generalization Questions

- *How would knowing more about brakes help you to be a better technician for your customers?*
- *What subjects in school do you believe would be relevant to the workings and design of a braking system?*

#### **ADVISOR'S PARTING THOUGHT**

Share the following:

*Think about what would have happened if early automobile manufacturers had only figured out how to make a car go but never designed a way to make it stop. Think of the damage and the injuries that would have occurred as vehicles collided with obstacles in their paths. It was critical that these inventors think beyond the first step and consider the consequences that would result.*

*This also is true of each of us. If we think only about today or only about how decisions will affect us, today's decisions and actions may have devastating results in the future. We must be intentional and thoughtful in the choices we make each and every day. Stephen Covey once wrote, "I am not a product of my circumstances. I am a product of my decisions."*

*I challenge each of you to consider ways in which you can prepare today to be a better person tomorrow.*

#### **ADVISOR AND OFFICER REVIEW**

After the meeting, address the following:

- Identify what was successful about the meeting.
- Identify what needed improvement.
- Schedule an officer and Advisor planning meeting to prepare for the next post meeting or activity.