

## Drivetrains

Explorers will be introduced to the basics of transmissions and drivetrains.

### CATEGORY

- Auto Technology
- Drivetrains

### OBJECTIVES

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

- Check and identify unserviceable transmission fluid.
- Identify the different parts of a manual transmission and an automatic transmission.
- Explain the basics of gear ratios and how this affects speed and torque.

### SUPPLIES

- Activity 1
  - At least one geared bicycle (having more will allow for more hands-on participation)
  - A watch or heart rate/blood pressure monitor
- Activity 2
  - Proper safety equipment for each participant (i.e., eye and ear protection, gloves)
  - Labeled cutaway diagrams of manual and automatic transmissions (optional)
  - One or more demonstration vehicles for use in identifying drivetrain components
  - A manual transmission and an automatic transmission that can be dismantled and worked on

**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

##### Cycling Activity

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

This activity demonstrates how gears affect the power required to propel a vehicle.

In a safe area such as a parking lot, take the heart rate (and blood pressure if you have the ability and means) of three of the Explorers. Record these numbers.

Have one of these Explorers get on the bike and ride as fast as possible for one minute, using the bike's lowest gear. When the time is up, measure and record the Explorer's heart rate and/or blood pressure. Repeat this activity with a second Explorer using a neutral or middle

gear and with a third Explorer using the bike's highest gear. (Note: As time allows, this can be done with each member of the post.)

Compare the initial and final heart rate and/or blood pressure readings.

## **Activity 2**

### **Main Event**

Begin the main event by asking the following questions:

- *How difficult was it to get the bike moving in your assigned gear?*
- *Did it get easier or more difficult as you went faster?*
- *What did you notice about the difference in the amount of effort it took, based upon the differences in your respective heart rates or blood pressures?*

Try to guide the discussion toward the conclusion that choosing the proper gear for the conditions will increase performance with the least amount of expended energy. Relate this to the purpose of gears in a drivetrain.

It is important that your Explorers have the opportunity to get their hands dirty and actually experience the workings of an engine. Find ways in which each participant can touch and manipulate the various parts of the drivetrain. If possible, have both manual and automatic transmissions available. You may also choose to break this activity into two meetings and focus on each type of transmission separately.

Raise your demonstration vehicle so that everybody can see the various components of the drivetrain, and give an overview of how each part contributes to the movement of the vehicle.

Depending upon the amount of time available, you may wish to have the Explorers drop the transmission out of the demonstration vehicle, or simply have a transmission available for them to work on.

Guide the Explorers through the process of dismantling and rebuilding the transmission.

During this process, talk about the following:

- Gears and gear ratios
- Torque versus speed
- Pressure plates and hydraulics
- Transmission fluids and lubricants
- Transaxles and differentials
- FWD, RWD, and 4WD/AWD configurations

As each part is inspected, discuss its function within the drivetrain. Explain the principles associated with gears and power loss or gain through their use or the way in which they are configured.

When you are done, give each participant an opportunity to identify each of the parts you have worked on and explain their function. Allow time for questions.

## 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 drivetrains that you didn't know before?*
- *Are drivetrains more or less complicated than you imagined?*

### Analysis Questions

- *What parts of the drivetrain do you think are most likely to cause problems or break down?*
- *How can a thorough understanding of the theories behind what makes a transmission work make you a better technician?*

### Generalization Questions

- *What aspects of transmission design would you like to learn more about?*
- *What subjects in school do you believe would be relevant to designing an improved transmission?*

## ADVISOR'S PARTING THOUGHT

Share the following thought:

*Today we have talked about transmissions and how gears control the speed of a car. Selecting the right gear for the road being traveled is critical. Using a gear that is either too high for a long, steep hill or too low for a downhill stretch on a fast freeway could result in burning out a transmission or other major damage to your car.*

*This is true of people as well. Each of us is traveling our own road through life. The speed at which we move must be carefully monitored. Go too slow and you'll find that life and its many opportunities will pass you by. Go too fast and you may miss the joy of relationships and the beauty that is found in the journey.*

*Perhaps the hardest thing to do is to allow others to travel their own road at the speed that's right for their circumstances. Perhaps we need to ask ourselves two questions each day when we get up. What can I do today to ensure I'm making the most of my life's journey? And how can I help others succeed as they travel on their own road?*

**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.