Tire Identification

Description
Students will be introduced to the basics of tire identification and how to interpret the sidewall markings. Maintenance of a tire is as important as knowing its use and application. Students will be instructed on how to recognize typical tire wear patterns and know when a tire should be replaced.

Lesson Outcomes
The student will be able to:

• Read, understand, explain and record identification markings on the tire sidewall
• Identify and explain the legal tread depth requirement for a highway tire
• Identify and describe the difference between a conventional and a directional tire
• Identify and describe several wear patterns of a tire and the probable causes

Assumptions

• The students will have little or no prior knowledge of tires or their use.
• The teacher is familiar with the information being taught.

Terminology

Aspect ratio: the relationship between the height of the tire’s sidewall and the tire’s width. If the height of the sidewall is 45% of the width, the aspect ratio is 45. In the tire size 225/45R17, the aspect ratio is 45.

Camber: the inward or outward tilt of the top of the tire. Positive camber is when the top of the tire is angled away from the centre of the vehicle (or car). Negative camber is when the top of the tire is angled towards the centre of the vehicle.

Directional tires: any tire that has an arrow on the sidewall indicating the direction of rotation. The tread is designed for the tire to work in one direction only. Mainly designed for wet road conditions. If the tire is put on the wrong side of the vehicle, then water between the tire and the road will build up and loss of traction will occur.

Sipes: the small slits included on the edge of a tire tread pattern, designed to increase traction.

Toe-in and toe-out: These two terms describe when the front of the tire points inward or outward. When the tires point inward the car is said to have toe-in. When the tires are pointing outward the car is said to have toe-out.
Tread depth: the distance from the base of the tread groove to the top of the tread.

Tread depth gauge: a measurement device used to measure wear and the remaining amount of tread on vehicle tires. In the U.S., the unit of measurement used in tread depth gauges is 32nds of an inch. In other countries, it is millimetres.

Wear bar: a band found between the tread blocks of a tire, designed to indicate when a tire is within $\frac{3}{32}$" (1.6 mm) of its tread depth and should be replaced.

Winter snowflake designation: the mountain/snowflake symbol found only on the sidewall of winter tires. Winter tires have a different tread pattern and tread compound that maximize traction during winter driving conditions.

Estimated Time
60 minutes (including a question and answer session)

Recommended Number of Students
20, based on the BC Technology Educators’ Best Practice Guide, working in pairs

Facilities
- Sufficient open space for each pair of students to move freely from station to station.
- Workbenches would be an asset, in order to have tires off the floor for ease of inspection.
- Shop facilities with access to compressed air would be an advantage but are not necessary.

Resources
- Handout of tire identification for each student to fill out for marking
- Used tires from a tire shop for students to diagnose—at least six different tires with a variety of types and sizes. The teacher will need to generate a record of all tire defects and their causes.

What Is The Winter Tire Symbol?
https://info.kaltire.com/what-is-the-winter-tire-symbol/

Winter Tire Safety Tips—Transport Canada
www.tc.gc.ca/eng/motorvehiclesafety/safevehicles-safetyfeatures-wintertires-index-468.htm

Proper Tire Inflation—Cooper Tire Canada
Activity

1. Group the students into pairs and have them document their names on their handout sheets.
2. Have students locate and write down the information required as per the handout.
3. Randomly pick students to explain to the class the sidewall information of the particular tire they are working on.
4. Explain the “snowflake” on a tire and why it is a winter standard below a specific temperature of 7°Celsius (because the rubber compound in summer tires gets too hard to get traction).
5. Explain how sipes help grip an icy surface.
6. Demonstrate the use of a tread depth gauge, and explain the legal limit of 3 mm of tread depth for a highway tire across 75% of the tread width. Show the “wear bar” indicator between the treads.
7. Have students individually measure a tire tread depth and record their findings on their own sheets for marking.
8. Have students inflate a tire to the correct cold pressure according to the owner’s manual. If the driver’s manual is not available or the door notice does not match the type or size of tire installed, the recommended inflation pressure to fill a tire should be about 3–5 psi less than maximum pressure listed on the tire sidewall. Maximum pressure is designed for use with maximum load—usually, a car is not fully loaded. Also, as tires warm up, the air inside them also warms, increasing the pressure. The link to a “Proper Tire Inflation” web page is included in the “Resources” section.
9. Students should be given a randomly selected used tire and be asked to describe the sidewall markings and determine any tread defects and possible causes.
Tire Identification and Markings

Figure 1—Mud and snow (P) passenger tire

Figure 2—Directional tire

Figure 3—Directional tire with wear bar indicated; depth gauge indicates 5 mm depth reading.

Figure 4—Siped directional tire

Figure 5—Conventional tire
Figure 6—The winter snowflake designation for winter-use tires

Figure 7—Winter snowflake designation on tire

Figure 8—All-season tire

Figure 9—All-season symbols
Some Common Tire Wear Patterns and Issues

**Figure 10—Centre wear**
The tire in Figure 8 was overinflated, causing the centre ring only to contact the road.

**Figure 11—Cracking and bulging**
Cracking and bulging usually comes from hitting a pothole, curb or from an older tire.

**Figure 12—Cupping**
Cupping happens when worn or damaged suspension components cause the tire to bounce as it travels. Bad shock absorbers are the usual cause.

**Figure 13—Underinflated tire**
The inside and outside edges are worn down; the middle is not. This is a telltale sign of underinflation.
Figure 14—Feathering
Feathering happens when a vehicle has a Toe In or Toe Out alignment issue. Note the slanted wear and high points on the edge of each row of tread.

Figure 15—Camber wear
With camber wear, the tire wears on one side only. This is usually a sign of the camber being out of adjustment.

Figure 16—Positive and negative camber

Figure 17—Negative camber car
Figure 18—Toe in and toe out

Figure 19—Tire wear from toe-in or toe-out
# Tire Identification Worksheet

Example below is for a Goodyear M&S (mud and snow) 235/60R15 radial tire with 8 mm tread wear remaining.

<table>
<thead>
<tr>
<th>Tire #</th>
<th>Tire Manufacturer</th>
<th>Type</th>
<th>Width</th>
<th>Aspect ratio</th>
<th>Diameter</th>
<th>Maximum pressure</th>
<th>Tread depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Goodyear</td>
<td>M&amp;S</td>
<td>235 mm</td>
<td>60 (%)</td>
<td>15 inches</td>
<td>35 psi</td>
<td>8 mm (5/16&quot;)</td>
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This space is to document any observations made of each tire.
<table>
<thead>
<tr>
<th>Tire Identification</th>
<th>Automotive Service Technician</th>
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