



ONTARIO COUNCIL
FOR TECHNOLOGY
EDUCATION

Automotive Tires

Grade 10 - TAS20/TTJ20

2024

Students will identify and troubleshoot tires on a live vehicle.



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Introduction

Course Code: TTJ20

Broad base Technology: Transportation Technology

Destination: Open

Grade Level: 10

Prerequisite : None

Project Name: Tires

Project Outline

In this project, students will develop knowledge and skills related to basic tire knowledge. They will first discover the meaning of the numbers and letters that describe the tire size and where to find the manufacturer's recommendations. They will inspect a vehicle's tires for size, wear, and pressure. Finally, they will list the various places in their area where they could do an apprenticeship in the tire industry and discover the latest technological advances in tires.

Prior Knowledge

Students who have already repaired a flat tire on a vehicle (bicycle, motorcycle, automobile) and have seen severe winter conditions would be an asset in this project. Students who own a moped, motorcycle, go-kart, or a remote-control vehicle will have useful knowledge to stimulate interactions with the teacher.

Student Activities

Activity 1 – The size of the tires and their date of manufacture.

Activity Summary:

Students will discover the meaning of the numbers and letters written on the sidewall of tires. They will have to find this information on the tire, on the body of the vehicle, and in the owner's manual, in automotive repair software, or on the Internet. They will inspect the tire rubber and make a judgment about the safety of the tire. They will then produce an inspection report that will be given to the teacher

Steps to follow:

1. If in a synchronous learning environment, meet at a time agreed upon by teachers and students. If in-person, the teacher begins to lead students by asking key questions:
 - Are tires important in your life?
 - Will you ever have to buy tires?
 - How many times a day do you put your life in the hands of tires?
 - Have you ever been in a car accident where a car lost control?
2. Have students go to a car or truck in the shop or at home and observe what is written on the sidewall of the tires. Have students take a few notes of what they observed on the tire.
3. Ask students to share their observations and lead a discussion about the meaning of all these numbers and letters.
4. Using the PowerPoint provided to present the meaning of the information found on the sidewall of the tires. Emphasize the size of the tires and the date of manufacture. The teacher should also present what can affect the life of a tire and how to inspect the tire rubber and thread.
 - a. Note: This PowerPoint includes videos and interactive activities. It also quite large. Download and present as a PowerPoint rather than a Google Slides.
 - b. 2024 PowerPoint Linked [HERE](#)

Transport Canada: [Meaning of the information written on the sidewall of the tires](#)

5. The teacher then presents the various places where the student can find the manufacturer's recommended dimensions.
 - a. Sticker inside the driver's door
 - b. Owner's manual
 - c. Auto repair software (Pro-Demand or other)
6. The student should then perform the following work on a vehicle in the shop or at home. The student should take approximately thirty minutes to do the visual inspection and take pictures. The written report should also take about 30 minutes.
 - a. If in a Synchronous or Asynchronous environment, students should document their observations with photographs taken with a personal device.
 - b. If in-person, the worksheet can be completed in class and handed in for assessment. Once graded, this should be included in the students portfolio or notebook.
7. Synchronous / Asynchronous worksheet provided below.
8. In-Person Worksheet linked [HERE](#)

Tire sizes and their date of manufacture

1. Find the manufacturer's recommended size on the sticker in the driver's door (sometimes the sticker can be located in the glove compartment or inside another door):

Attach the picture here

2. Find the manufacturer's recommended size in the owner's manual, in a repair software or on the Internet.

Attach the picture here

3. Using the information found in questions 1 and 2, write the manufacturer's recommended size for the vehicle:

- Front tire: _____
- Rear tire: _____
- Spare tire (if available): _____

4. Take a picture of the sidewall of the inspected vehicle's tire and find the following information about the tire:

Attach the picture here:

Information to be found on the sidewall of the tire	Student's answers
Tire make and model	
Width of tire (in mm)	
Tire height (in %)	
Wheel rim diameter (in inches)	
Tire load rating	
Tire speed rating	
Date manufactured	

5. **A) Are the vehicle's tires within the manufacturer's recommended size?** Use the information found in the PowerPoint and from the class discussion

6. **B) Are the vehicle's tires safe for their age and rubber condition.** Use the information found in the PowerPoint, the class discussions with the teacher and by observing the condition of the rubber of the four tires and their date of manufacture.

Attach a photo of the date of manufacture of the tire:

Activity 2 – Tire inspection on a vehicle

Activity Summary:

Students will be required to inspect a vehicle's tires at home or in the school shop. They will have to determine if the tires are inflated to the correct pressure, have even wear and are safe for the road. They will then produce an inspection report that will be given to the teacher.

Steps to follow:

1. If in a synchronous learning environment, meet at a time agreed upon by teachers and students. If in-person, the teacher begins to lead students by asking key questions:
 - What is the life span of a car, motorcycle, bicycle, farm vehicle tire, etc.?
 - What is the consequence of having an under-inflated tire on your bike?
 - What is the consequence of having an overinflated tire on your bike?
 - What is a tire rotation and why is it important to do it at regular intervals?
 - What are the risks of using a tire with excessive tread wear
1. The teacher asks the students to go to a bicycle, car or truck in the shop or at home and visually observe the tire pressure and wear. Students should make a few notes about what they observed in terms of tire pressure and wear on each tire on the vehicle, making sure to record the position of the tire.
2. Have students share their observations and lead a discussion about manufacturer's recommended pressure and a tread with safe wear.
3. Using the PowerPoint provided (same as Activity 1) or the Transport Canada website, present a lesson on recommended tire pressure, checking tire pressure, checking for tire wear and uneven tire wear.
 - i. [2024 PowerPoint Linked](#) [HERE](#)
 - ii. [Transport Canada: When was the last time your tires were checked?](#)

The teacher then presents the different places where the student can find the pressure recommended by the manufacturer.

- b. Sticker inside the driver's door
- c. Owner's manual
- d. Auto repair software (ProDemand or other)

4. The student should then perform the following work on a vehicle in the shop or at home. The student should take approximately 30 minutes to do the visual inspection and take pictures. The written report should also take about 1 hour to complete. Students should document their observations with photographs taken with a personal device.

The student may choose to present the following information using Google Slide or PowerPoint

Slide 1:

Title : Vehicle presentation

- Your name
- A picture of your selected shop or parents' car.
- Identify the make, model and year of the vehicle.

Slide 2:

Title : Recommended tire pressure

- Insert a photo of the sticker (located in the driver's seat) that indicates the recommended tire pressure. If not available, the use of an owners manual is permitted.
- Identify the recommended tire pressure for the front tires, rear tires and spare tire with a pressure measurement unit.

Slide 3:

Title : Driver's side front tire inspection

- Insert a photo of the driver's side front left tire that shows its overall condition.
- Inspection of the tire: did you observe any cracks in the rubber, rocks, a nail or screw in the tire, or uneven wear?
- Inspection of the tire tread. Is the tire wear safe? Show result with a picture of a depth gauge (if available) or with a Canadian quarter.

Slide 4:

Title : Passenger's side front tire inspection

- Insert a photo of the passenger's side front right tire that shows its overall condition.
- Inspection of the tire: did you observe any cracks in the rubber, rocks, a nail or screw in the tire, or uneven wear?
- Inspection of the tire tread. Is the tire wear safe? Show result with a picture of a depth gauge (if available) or with a Canadian quarter.

Slide 5:

Title : Driver's side rear tire inspection

- Insert a photo of the **driver's side rear tire** that shows its overall condition.
- Inspection of the tire: did you observe any cracks in the rubber, rocks, a nail or screw in the tire, or uneven wear?
- Inspection of the tire tread. Is the tire wear safe? Show result with a picture of a depth gauge (if available) or with a Canadian quarter.

Slide 6:

Title : Passenger's side rear tire inspection

Insert a photo of the **passenger's side rear tire** that shows its overall condition.

- Inspection of the tire: did you observe any cracks in the rubber, rocks, a nail or screw in the tire, or uneven wear?
- Inspection of the tire tread. Is the tire wear safe? Show result with a picture of a depth gauge (if available) or with a Canadian quarter.

Slide 7:

Title : Conclusion

Answer the following questions:

- Are my parents' tires safe for the upcoming season? Justify your answer with two arguments.
- Why is it important to inspect tires regularly on a vehicle? Justify your answer with three arguments.

Activity 3 – Research: Potential employers and technological advances

Activity Summary

Students will have to locate on a map various potential employers related to the tire industry (tire creation/design, manufacturing, sales, installation, repair, retreading) for different types of vehicles (bicycle, motorcycle, automobile, heavy equipment, off-road vehicle, agricultural vehicles, etc.). They will also explore the various technological advances in tires in recent years by presenting a summary of three technological innovations in recent years.

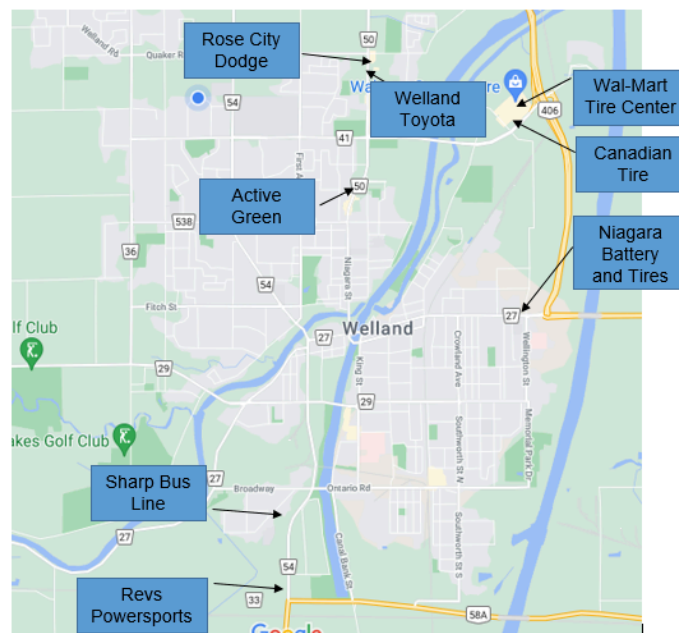
Steps to follow:

Name: _____

Research: Potential employers and technological advances.

1. Using a tool like Google Map, explore your home with a radius of about 20 kilometers to find potential employers that would allow you to use the knowledge you have learned about tires.
2. Find and copy a map similar to this one. Insert or paste the image into a word processor and identify the different businesses found with an arrow and the name of the business.

Ex.: Welland:



3. Classify the employers found in a table that specifies the type of business they operate and their address. There may be more than one employer per type of business. Then estimate the number of employees in that business.

Ex. :

Company's name	Type of business	Address	Estimated number of employees
	Bicycle repair shop		
	Motorcycle repair shop		
	Off-road vehicle repair shop		
	Auto repair shop		
	Heavy equipment repair shop		
	Farm vehicle repair shop		
	Industrial vehicle repair shop		
	Company of design and manufacture of tire		
	Others:		

4. Work Scenario: You work at one of the businesses found above, how would you respond to a customer who asked you the following questions:
- a) I drive a pickup truck with P235/75R17 105T tires and I would like to have a tire that is more resistant to loads when I pull a loaded trailer. What tires do you recommend?
 - b) I have the option of purchasing used tires mounted on a wheel, but with a slightly larger diameter. What would be the effect on my vehicle if I installed these larger tires? (Considerations: gas mileage, mileage/odometer on vehicle, speedometer, safety aspects, rubbing when turning, etc.)
5. The tire industry is constantly evolving. There have been many technological innovations in recent years that allow vehicles to be safer and more efficient. Choose three technological innovations from recent years and present how these improvements make vehicles safer in a Google Slide or PowerPoint.

Here is a non-exclusive list of innovations you could choose from.

- a. TPMS
- b. Nitrogen to inflate tires
- c. Tweel
- d. Remote tire inflation
- e. Tread Design
- f. Tire wear and adhesion sensor
- g. Uptis tire
- h. Tires designed for EVs
- i. Run-flat tire
- j. Airless tires
- k. Eco-friendly Tires
- l. Smart Tires (IoT)

Planning Notes

If in a Synchronous environment, teachers should provide some form of video conferencing to interview students during activities if the learning is online or have a vehicle for classroom/group learning. This way, teachers can assess a vehicle with their students.

Here are other suggestions,

- Some lessons could be supplemented by educational resources available on the Internet.

In person environment is preferred due to the nature of this activity and to provide immediate assistance and feedback.

Skilled Trades and Apprenticeship Opportunities

These activities allow students to develop transferable skills applicable to many career pathways, specifically the following Trades and Apprenticeships:

Trade Name	Trade Code	Classification	Exam	Red Seal	Trade Details
Agricultural Equipment Technician	425A	Non-Compulsory	YES	YES	Details
Alignment and Brakes Technician	310E	Compulsory	YES	NO	Details
Automotive Service Technician	310S	Compulsory	YES	YES	Details
Heavy Duty Equipment Technician	421A	Non-compulsory	YES	YES	Details
Motorcycle Technician	310G	Compulsory	YES	YES	Details

Powered Lift Truck Technician	282E	Non-compulsory	YES	NO	Details
Recreation Vehicle Technician	690H	Non-compulsory	YES	YES	Details

Career and Industry Extensions

These activities further allow students to develop transferable skills applicable to many career pathways, specifically:

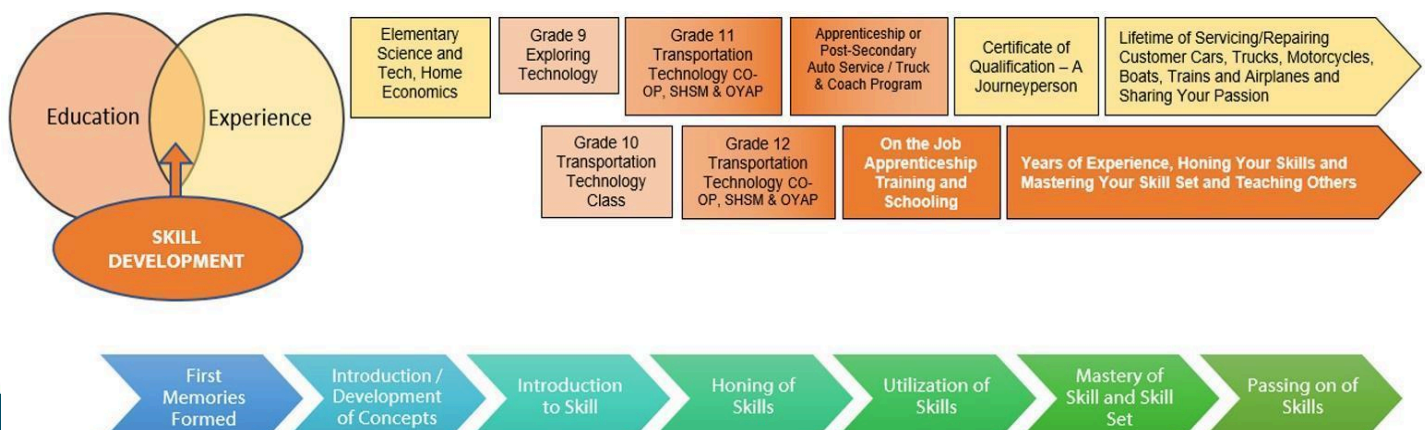
- Tire Technician
- Commercial/Heavy Duty Tire Technician
- Vehicle Service Technician
- Tire Disposal and Recycling Specialist
- Tire Sales

Continuum of Influence

The teacher can talk about the importance of tires in our daily lives. The teacher can also make students realize that most adult will have to purchase new or used tires for a vehicle at some point in their lives. Therefore, it is important to have some knowledge about tires.

The PowerPoint included above has built-in pauses for Diagnostic Assessment and opportunities for conversation.

The full continuum of influence can be found in [Appendix D](#).



Resources

Documents:

[2024 PowerPoint](#) (NEW)

[2024 Student Worksheet](#) (NEW)

[PowerPoint on Tire inspection example for student.](#)

[PowerPoint on Tire pressure and wear.](#)

[PowerPoint on Tire size and age.](#)

Lesson Plan

Tire sizes and their date of manufacture - Activity 1 - 110 minutes Level: 10 – TTJ2O		
Learning Goals	At the end of the activity, students will be able to: • Understand the meaning of the numbers and letters on the sidewall of a vehicle's tires. • Find manufacturer's recommended dimensions on the vehicle, in a repair software, or on the Internet. • Inspect a vehicle and determine if the tires meet the recommended dimensions. • Find the tires manufacturing date and inspect whether the rubber is in good working condition.	Material: A vehicle at home or at school
Success Criteria	The success criterion is: • Inspect a vehicle and make judgments about tire size and age.	
Activate student thinking (20 min)	Teacher asks students questions to stimulate interest: 1. Are tires important in your life? 2. Will you ever have to buy tires?	A video in which we see: An accident where a vehicle loses control on the road due to lack of grip.

 	3. How many times a day do you put your life in the hands of tires? 4. Have you ever been in a car accident where the car lost control?	- vehicles with oversized tires.
Development of students' thinking (30 min)   	Students will inspect a vehicle in the shop for tire dimensions and other useful information to stimulate discussion and sharing. The teacher gives a lesson on the meaning of the numbers/letters on the sidewall of the tires.	Have a vehicle in the shop for demonstration Accommodating Students with IEPs Pairing the student with a high-performing student.
Consolidate student thinking (60 min) 	Distribute Activity 1 in which the student must: - find and take a picture of the manufacturer's recommended dimensions sticker. - Find and capture the manufacturer's recommended tire size in a repair software program or on the Internet. - Inspect the four tires and take a picture of the tire size and date of manufacture. - Make a judgement on the size of the tires and their date of manufacture.	Have different vehicles available in the shop. Have a camera available for students without cell phones.

Tire inspection on a vehicle – Activity 2 - 120 minutes Level : 10 – TTJ2O		
Learning Goals	At the end of the activity, students will be able to:	Material:

	Inspect a vehicle's tires and produce a professional report.	A vehicle at home or at school
Success Criteria	The success criterions are: • Visually inspect tire tread for uneven wear. • Measure tire pressure. • Measure the tread with a wear gauge or 25c. • Provide professional opinion in relation to tire safety.	
Activate student thinking (15 min) A for L AV	Teacher asks students questions to stimulate interest: 1. What is the life span of a car, motorcycle, bicycle, farm vehicle tire, etc.? 2. What is the consequence of having an under-inflated tire on your bike? 3. What is the consequence of having an overinflated tire on your bicycle? 4. What is a tire rotation and why is it important to do it at regular intervals? 5. What are the risks of using a tire with excessive tread wear?	Support: The teacher could have a bike with underinflated tires and a bike with overinflated tires to demonstrate.
Development of students' thinking (45 min)	- The teacher, using the Powerpoint provided or the Transport Canada website, presents a lesson on recommended tire pressure, checking tire pressure, tire wear and uneven tire wear	Have a vehicle in the shop for demonstration Accommodating Students with IEPs

A_{as} L DI 	- Students inspect a vehicle in the shop and share their observations of tire wear and pressure.	Pairing the student with a high-performing student.
Consolidate student thinking (60 min) A_{of} L	Distribute Activity 2 in which the student must: - inspect another vehicle in the shop or at home - produce an inspection report using presentation software and several photographs. - If available, the student will use a pressure gauge and wear gauge to produce a professional report.	Have different vehicles available in the shop. Have a camera available for students without cell phones. Have pressure gauges and wear gauges available.

Research : Potential employers and technological advances – Activity 3 - 120 minutes Level : 10 – TTJ2O		
Learning Goals	At the end of the activity, students will be able to: - Find potential employers for a possible apprenticeship. - Develop expertise in tire evolution.	Material: Have computers available with Internet access.
Success Criteria	The success criterions are: - Locate potential employers in the region on a map. - Categorize the employers by industry and estimate the number of employees. - Present three technological advances in tires.	
Activate student thinking (20 min)  	Teacher asks students questions to stimulate interest: - The teacher, with the help of the students, names different potential employers in their town or village. - Students then identify the different types of businesses that work with tires in their town or village.	Support: A map of the region

Development of students' thinking (40 min)   	- Students are to locate on a map of their area the various employers involved in the tire business. - Students should select three technological advances in tires and identify how these advances make vehicles safer.	Accommodating Students with IEPs Pairing the student with a high-performing student.
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Consolidate student thinking (60 min) A of L	Distribute Activity 3 in which the student must: - Classify in a table, the different employers in the area according to the type of business they do. - Estimate the number of employees at the businesses found. - Produce a presentation that explains how the three technological advances are making vehicles safer.	Have computers available with Internet access.
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Icon	Opportunity identified within the lesson
A for L	Assessment FOR Learning
A as L	Assessment AS Learning
A of L	Assessment OF Learning
DI	Opportunity for educational differentiation according to the school environment
AV	Audio/video (Video, Sound, PowerPoint, etc.)
	Collection of information for assessment or evidence of learning purposes.
	Search on the Internet or in a book
	Professional dialogue

Answer sheets

Answer sheet Activity 1 ([Appendix A](#))

Answer sheet Activity 3 ([Appendix C](#))

Tools

If the student has access to a pressure gauge and a wear gauge, the project will have a more professional dimension when reporting the results of the inspection.

Software

Repair software would be an asset in this project.

Web sites for teachers:

[Transport Canada : Riding On Air \(Government of Canada\)](#)

The Hook / Motivational Strategies

Teachers may use any of the following instructional strategies; 3-Part lesson, lecture, storyboard, word wall, think-pair-share, placemat activity, rapid write, K-W-L, anticipation chart, ABC taxonomy, think aloud, analyzing text, Cornell note taking, exit ticket/ticket out the door, plus/minus/delta, etc.

The updated 2024 PowerPoint has opportunities for student conversation and reflection with real-world connections and both teacher and student led conversation.

Learning Goals and Success Criteria

By the end of this project students will be able to:

- Understand the identifications on the sidewalls of tires.
- Inspect tire sizes, pressure, and wear on a vehicle.
- Locate job and learning opportunities on a map of their city or town.
- Describe some technological innovations in tires in recent years.

Overall and Specific Expectations in Support of Ontario Curriculum **Grade 10 TAS20**

Overall Expectations

A1. Initiating and Planning - demonstrate an understanding of fundamental technological concepts and related skills by initiating and planning projects

A2. Designing and Performing - develop projects that involve creating products and/or services, using a variety of resources and techniques, and record the development of their projects

A3. Analyzing and Refining - evaluate and refine processes, products, and/or services

A4. Following Health and Safety Practices - apply an understanding of health and safety practices and procedures when using materials, tools, and equipment

B1. Fundamentals of Technological Development - demonstrate an understanding of how various needs and underlying social, economic, and environmental factors drive the evolution of technology

B2. Impacts of Technology - analyze impacts of various technologies on individuals, society, the economy, and the environment

B3. Careers and Pathways in Technology and the Skilled Trades - explore and describe careers in technological fields and the skilled trades, and pathways for entering them

Specific Expectations

A1.5 establish evaluation criteria for products and/or services being developed, including qualitative and/or quantitative measures, making connections to relevant fundamental technological concepts

A2.3 describe properties and characteristics, including sustainability, of materials, and justify the selection of the materials and other resources they are using in the creation of products and/or services

A2.4 select, use, and maintain tools and equipment appropriately as part of creating products and/or delivering services

A2.5 use a variety of industry-related documents to guide the creation of products and/or the delivery of services as part of their projects

A2.6 create products and/or deliver services, documenting their development process using appropriate industry terminology

A2.7 select appropriate units of measure and tools to make accurate measurements using relevant measurement systems, such as the metric and imperial systems

A3.2 analyze the performance of products and/or service delivery using appropriate criteria

A3.3 identify potential refinements to the design of products and/or services based on an analysis of data collected throughout the development process

A4.2 identify hazards in their environment, and apply strategies to minimize risks

A4.3 use tools and equipment safely, including using personal protective equipment and safety devices as appropriate

A4.4 follow practices that support physical and mental health and well-being

A4.6 demonstrate a safety mindset by making safety a priority at all times and by engaging in industry-specific safety procedures

B1.1 investigate and describe interrelationships between user needs and the development of various technological solutions

B2.1 identify short-term and long-term impacts of various technological innovations on individuals and societies, including the impact on everyday life

B2.2 explain local and global impacts of various technological innovations on the environment and the economy, including the labour market

B3.1 explore a variety of roles, responsibilities, and opportunities related to current and emerging careers in technological fields, including a variety of broad-based technology areas, and the skilled trades

B3.4 evaluate the transferable skills they are developing and analyze how these skills relate to current and emerging careers in technological fields and the skilled trades

Overall and Specific Expectations in Support of Ontario Curriculum **Grade 10 TTJ20**

Overall Expectations

A4. demonstrate an understanding of the technical and mathematical knowledge and skills required to properly maintain and repair vehicles, aircraft, and/or watercraft.

B3. perform basic service on various vehicle, aircraft, and/or watercraft systems and components.

C1. demonstrate an understanding of ways in which various aspects of the transportation industry affect the environment and ways in which harmful effects can be remedied or reduced.

C2. demonstrate an understanding of the relationship between various aspects of the transportation industry and society.

D1. demonstrate an understanding of and compliance with occupational health and safety regulations and standards in transportation technology.

D2. identify career opportunities in the transportation industry and the education and training required for them

Specific Expectations

A4.1 use appropriate resources (e.g., shop manuals, online information) to find information as required for basic maintenance and repair of vehicles and/or craft;

A4.2 report on work in progress (e.g., complete a work order, parts list, and/or journal) using appropriate documentation;

A4.3 apply appropriate mathematical and/or scientific principles, procedures, and terms and symbols when conducting and/or reporting on work on vehicles and/or craft (e.g., convert measures from US customary/British imperial units to metric units – pounds per square inch [PSI] to kilopascals [kPa], gallons to litres; calculate antifreeze-to-water ratio);

B3.2 perform appropriate measurements related to system components (e.g., tire pressure; chain, cable, and/or belt tension and wear; specific gravity of engine coolant; battery voltage), making any necessary adjustments to meet manufacturers' specifications;

C1.1 research and report on ways in which the transportation industry affects the environment and on efforts being made to remedy or reduce harmful effects (e.g., improved production methods, automotive parts recycling), including ways of disposing of waste products (e.g., used oil, used batteries, used paint/thinners);

C2.1 research and report on the development of improved safety features in transportation technology (e.g., airbags, anti-lock brakes);

C2.2 describe recent technological innovations (e.g., related to performance, comfort, driveability, fuel economy, recycling of parts) in vehicles and/or craft;

D1.1 identify and explain the importance of legislation and regulations related to procedures and operations used in transportation technology facilities (e.g., Occupational Health and Safety Act [OHSA], Workplace Hazardous Materials Information System [WHMIS], Apprenticeship and Certification Act);

D2.2 identify a variety of career opportunities in the transportation industry (e.g., apprenticeship/ trade, parts retail, business ownership) and describe the secondary school pathways (i.e., selection of courses, programs, and experiential learning opportunities) that would provide the best preparation for these careers;

Safety Concerns

Activities at this resource are considered low risk. The vehicle being inspected must be immobilized by the owner, not the student. At no time should the student put any part of their body under the inspected vehicle. This is a visual inspection only. Proper ergonomics should be emphasized when sitting and working at the computer.

Applicable SAFEDocs and ToolSAFE Videos

This project has been established as an online or blended format. Should ask students to look under the hood or perform other inspections on vehicles, please refer to the [OCTE SAFEDocs for Transportation Technology](#) for safety documents.

Project Challenges

Some students may not have access to a vehicle at home to do an inspection. Some tires may not have all the correct identifications on the sidewall or the identifications may be illegible due to premature wear or dirt. Some students may live in a large city or small town and this could make it difficult to research the types of businesses.

Differentiation of the Project / Activity

Teachers can differentiate this project by having students research and inspect vehicles that are readily available or owned by themselves or family members. This could be a motorcycle, ATV, or any other form of transportation. They may also work on types of vehicles used primarily in their community such as farm vehicles, mining vehicles or cargo/passenger aircraft. Teachers can also refer to the [Differentiation Scrapbook](#) to take into account for learner ability, multiple intelligences, exceptional students, and ESL learners.

Assessment and Evaluation

Categories	50-59% (Level 1)	60-69% (Level 2)	70-79% (Level 3)	80-100% (Level 4)
Knowledge and Understanding – Subject-specific content acquired in each course (knowledge), and the comprehension of its meaning and significance (understanding)				
	The student:			
Understanding of Content: Demonstrate an understanding of tire dimensions (width, height, diameter, radial, speed rating, load rating, tire make and model) and sidewall identifications.	demonstrates limited knowledge of content	demonstrates some knowledge of content	demonstrates considerable knowledge of content	demonstrates considerable thorough of content
Understanding content: Demonstrate an understanding of tire wear (wear indicator, premature wear, even wear) and the manufacturer's recommended tire pressure.	demonstrates limited knowledge of content	demonstrates some knowledge of content	demonstrates considerable knowledge of content	demonstrates considerable thorough of content

Thinking – The use of critical and creative thinking skills and/or processes.				
	The student:			
Use of planning skills: The student plans an inspection time for a vehicle in the shop or at home. Document their observations with photographs for each tire inspected.	uses planning skills with limited effectiveness	uses planning skills with some effectiveness	uses planning skills with considerable effectiveness	uses planning skills with a high degree of effectiveness
Use of processing skills: Find tire dimensions, date of manufacture and manufacturer's recommended sizes and pressures. He also finds three technological innovations related to tires.	uses processing skills with limited effectiveness	uses processing skills with some effectiveness	uses processing skills with considerable effectiveness	uses processing skills with a high degree of effectiveness
Use of critical/creative thinking processes: The student responds to a potential customer with an appropriate opinion and rationale about tire dimensions.	uses critical/creative thinking process skills with limited effectiveness	uses critical/creative thinking process skills with some effectiveness	uses critical/creative thinking process skills with considerable effectiveness	uses critical/creative thinking process skills with a high degree of effectiveness

Communication – The conveying of meaning through various forms.				
	The student:			
Expression and organization of ideas and information: The student gives his/her opinion on the size, wear and age of the tires on the vehicle he/she has inspected. The student identifies and classifies the different types of businesses in his/her city or town that relate to the different types of tires.	expresses and organizes ideas and information with limited effectiveness	expresses and organizes ideas and information with some effectiveness	expresses and organizes ideas and information with considerable effectiveness	expresses and organizes ideas and information with a high degree of effectiveness
Use of communication for different audiences in oral, visual, and written forms: The student creates a presentation that shows the results of their visual inspection of a vehicle's tires. The student creates a presentation that explains three technological innovations in tires in recent years.	communicates for different audiences and purposes with limited effectiveness	communicates for different audiences and purposes with some effectiveness	communicates for different audiences and purposes with considerable effectiveness	communicates for different audiences and purposes with a high degree of effectiveness

Use of conventions vocabulary, and terminology of the discipline in oral, visual, and written forms: The student uses the correct terminology in the correct context. (tire width and height, tire diameter, load and speed rating, wheel, tread, sidewall, wear indicator, uniform and premature wear, radial, passenger tire, light truck tire, wear gauge) ;	uses conventions, vocabulary, and terminology of the discipline with limited effectiveness	uses conventions, vocabulary, and terminology of the discipline with some effectiveness	uses conventions, vocabulary, and terminology of the discipline with considerable effectiveness	uses conventions, vocabulary, and terminology of the discipline with a high degree of effectiveness
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Application – The use of knowledge and skills to make connections within and between various contexts				
	The student:			
Application of knowledge and in familiar contexts: The student inspects a vehicle's tires for size, age and wear.	applies knowledge and skills in familiar contexts with limited effectiveness	applies knowledge and skills in familiar contexts with some effectiveness	applies knowledge and skills in familiar contexts with considerable effectiveness	applies knowledge and skills in familiar contexts with a high degree of effectiveness
Transfer of knowledge and skills to new contexts: The student answers questions about the size of the tires, their load and speed codes.	transfers knowledge and skills to new contexts with limited effectiveness	transfers knowledge and skills to new contexts with some effectiveness	transfers knowledge and skills to new contexts with considerable effectiveness	transfers knowledge and skills to new contexts with a high degree of effectiveness
Making connections within and between various contexts: Students will identify potential employers for an apprenticeship or professional career in their city or town.	makes connections within and between various contexts with limited effectiveness	makes connections within and between various contexts with some effectiveness	makes connections within and between various contexts with considerable effectiveness	makes connections within and between various contexts with a high degree of effectiveness

Assessment for Learning

Assessment for learning is reflected in each lesson plan

Assessment as Learning

Assessment as learning is reflected in each lesson plan

Assessment of Learning

Assessment of learning is reflected in each lesson plan

Environmental Considerations

The teacher should address tire recycling and retreading in order to make students aware of environmental considerations. Students will have a good understanding of the importance of having proper tire pressure to minimize their environmental footprint.

Reflection or Design Report

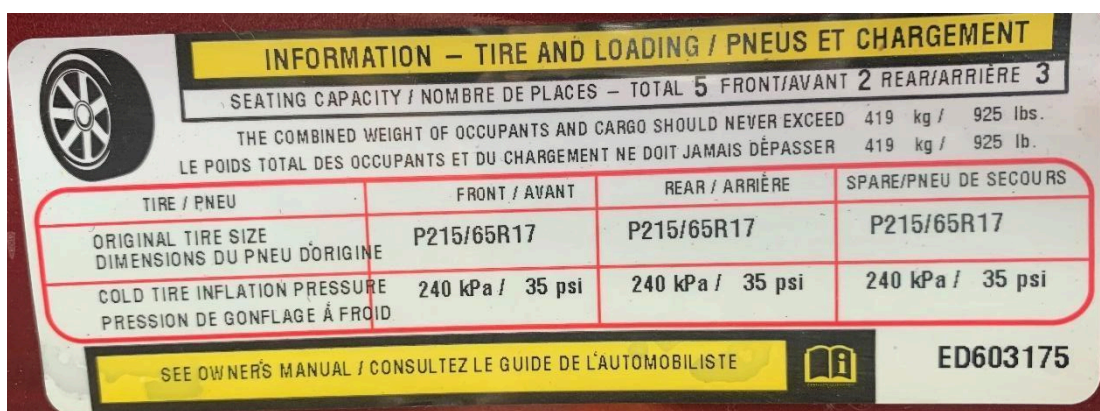
Teachers may wish to have the students complete a design report, reflection or create a foldable to consolidate their learning. This would be a nice way to capture the student's understanding in a summative format and be used in preparation for their examination, entering post-secondary education or the workforce.

Appendix A – Answer Sheet Activity 1

Name: _____

Tire sizes and their date of manufacture.

1. Find the manufacturer's recommended size on the sticker in the driver's door (sometimes the sticker can be located in the glove compartment or inside another door) :



INFORMATION – TIRE AND LOADING / PNEUS ET CHARGEMENT			
SEATING CAPACITY / NOMBRE DE PLACES – TOTAL 5 FRONT/AVANT 2 REAR/ARRIÈRE 3			
THE COMBINED WEIGHT OF OCCUPANTS AND CARGO SHOULD NEVER EXCEED		419 kg / 925 lbs.	
LE POIDS TOTAL DES OCCUPANTS ET DU CHARGEMENT NE DOIT JAMAIS DÉPASSER		419 kg / 925 lb.	
TIRE / PNEU	FRONT / AVANT	REAR / ARRIÈRE	SPARE/PNEU DE SECOURS
ORIGINAL TIRE SIZE DIMENSIONS DU PNEU D'ORIGINE	P215/65R17	P215/65R17	P215/65R17
COLD TIRE INFLATION PRESSURE PRESSION DE GONFLAGE À FROID	240 kPa / 35 psi	240 kPa / 35 psi	240 kPa / 35 psi

SEE OWNER'S MANUAL / CONSULTEZ LE GUIDE DE L'AUTOMOBILISTE

ED603175

2. Find the manufacturer's recommended size in the owner's manual, in a repair software or on the Internet.

Jeep Compass 2014 2.4i

Tire	Rim	
215/60R17 95T	6.5Jx17 ET40	2.2
215/65R17 98S	6.5Jx17 ET40	2.2
215/55R18 94T	7Jx18 ET40	2.4
225/60R17 95H	7Jx17 ET40	2.4

There are several possible sizes depending on the level of equipment chosen. With my Compass vehicle, I can see that the size 215/65R17 98S is listed.

3. Using the information found in questions 1 and 2, write the manufacturer's recommended size for the vehicle:

- Front tire : ____ **P215/65R17 98S** _____
- Rear tire: ____ **P215/65R17 98S** _____
- Spare tire (if available): ____ **P215/65R17 98S** _____

4. Take a picture of the sidewall of the inspected vehicle's tire and find the following information about the tire:



Information to be found on the sidewall of the tire	Student's answers
Tire make and model	Goodyear Nordic Winter
Width of tire (in mm)	225
Tire height (in %)	65
Wheel rim diameter (in inches)	17
Tire load rating	102
Tire speed rating	S

Manufactured date	49th week of 2018
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5. **A) Are the vehicle's tires within the manufacturer's recommended size?** Use the information found in the PowerPoint and from the class discussion.

The tires on the inspected vehicle do not meet the manufacturer's recommended dimensions. The width of the installed tires is 225 mm and the manufacturer recommends 215. The tires are therefore 10 mm too wide. Moreover, the tires are a little too high, because 65% of 225 (146.25 mm) does not give the same ratio for the height as 65% of 215 (139.75 mm). The tires are therefore 6.5 mm too high compared to the recommended height. The tire has a slightly higher load rating than originally (102 instead of 98) and an identical speed rating S.

6. **B) Are the vehicle's tires safe for their age and rubber condition.** Use the information found in the PowerPoint, the class discussions with the teacher and by observing the condition of the rubber of the four tires and their date of manufacture.

Yes, the tires are safe, as they were all made in late 2018. So, they are three years old and the rubber is still in good condition. The rubber on a tire typically has a life span of about 6 years. I did not notice any cracking or premature aging on any of the four tires.



Appendix B – Answer Sheet Activity 2

Vehicle presentation

- ❑ Student's name
- ❑ Toyota Sienna 2010
- ❑ 210 387 km (optional)



Recommended tire pressure

TIRE AND LOADING INFORMATION RENSEIGNEMENTS RELATIFS AUX PNEUS ET À LA CHARGE DU VÉHICULE			
SEATING CAPACITY NOMBRE DE PLACES		TOTAL: 7	FRONT: 2, REAR: 5
The combined weight of occupants and cargo should never exceed 520kg or 1150lbs. La charge du véhicule (occupants et bagages) ne doit jamais dépasser 520kg ou 1150lb.			
TIRE PNEUS	ORIGINAL TIRE SIZE DIMENSIONS DES PNEUS D'ORIGINE	COLD TIRE INFLATION PRESSURE PRESSION DE GONFLAGE À FROID	
FRONT AVANT	P215/65R16	240 kPa, 35 PSI	
REAR ARRIÈRE	P215/65R16	240 kPa, 35 PSI	
Spare SECOURS	T155/80R17	420 kPa, 60 PSI	

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
CONSULTER LE GUIDE DU PROPRIÉTAIRE POUR DE PLUS AMPLES RENSEIGNEMENTS

- Front and rear tires should be inflated to 35 PSI.
- Spare tire should be inflated to 60 PSI.

Driver's side front tire inspection

- I observed a few small cracks.
- I observed one or two small rocks in the tires.
- The wear is uniform.
- The tire is still good for one season.



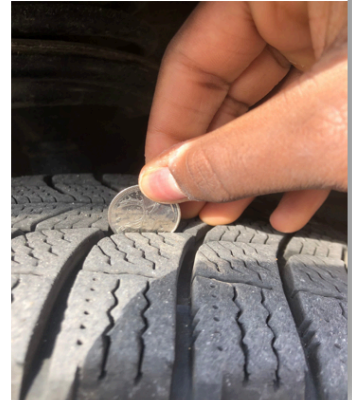
Front passenger tire inspection

- I did not observe any uneven wear.
- I did not observe any cracks in the tire.
- There were about 5 small rocks in the tire.
- The tire is still good for another season.



Driver's side rear tire inspection

- I didn't see any uneven wear, but this tire was more worn than the other tires.
- I did not observe any cracks in the tire.
- I did not see any rocks in the tire.
- The tire is still good for another season.



Passenger side rear tire inspection

- I did not notice any uneven wear.
- I did not observe any cracks in the tire.
- There were about 8-10 rocks in the tire.
- It is still good for another season.



Objectivation

Are my parents' tires safe for the next season?

I think my parents' tires are safe because I didn't really see any cracks, and there weren't really any big rocks. Also, according to my parents, the tires are fairly new. However, I don't have a way to check the tire pressure.

Why should tires be inspected regularly?

We need to inspect our tires regularly, because it's essential for your safety on the road. It also helps reduce your car's fuel consumption and exhaust emissions. And it makes your tires last longer.

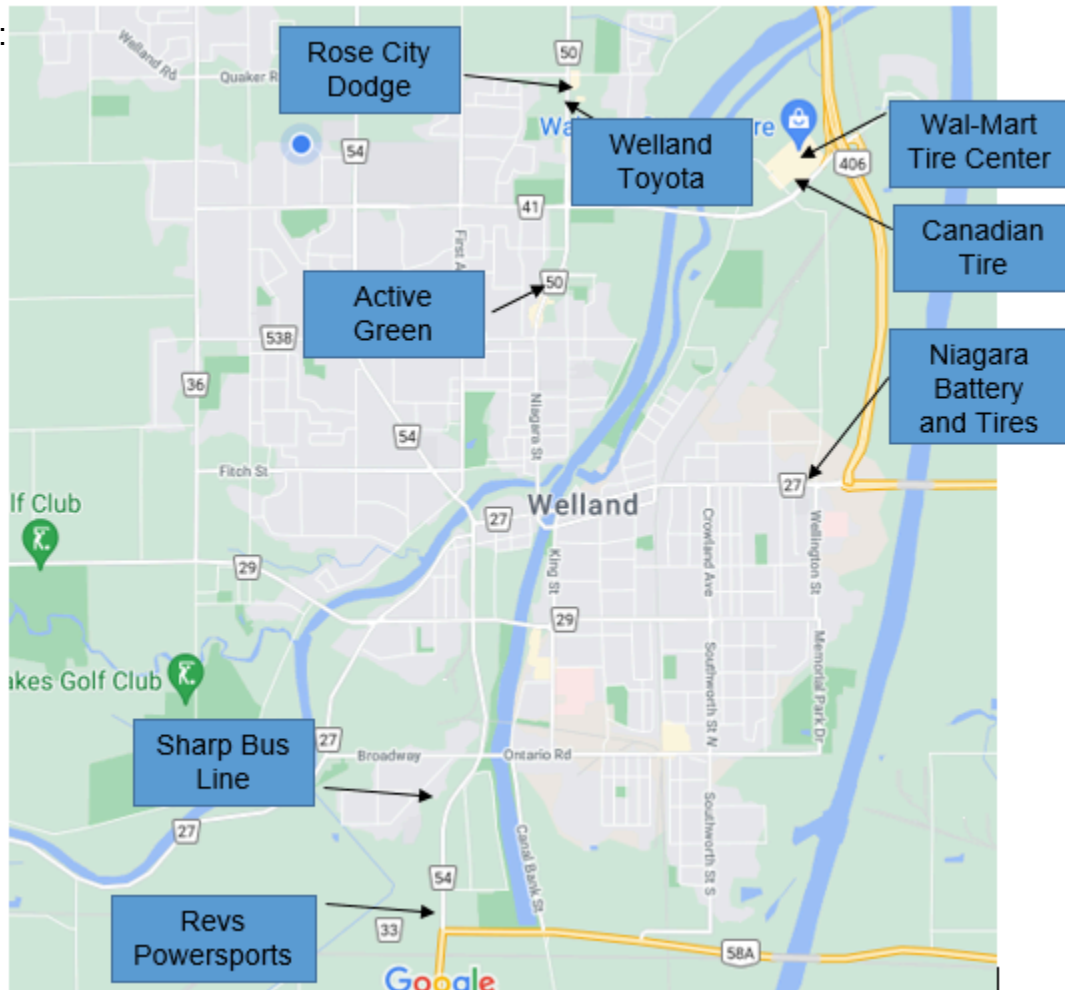
Appendix C – Answer Sheet Activity 3

Name: _____

Potential employers and technological advances

1. Using a tool like Google Map, explore your home with a radius of about 20 kilometres to find potential employers that would allow you to use the knowledge you have learned about tires.
2. Find and copy a map similar to this one. Insert or paste the image into a word processor and identify the different businesses found with an arrow and the name of the business.

Ex. :



3. Classify the employers found in a table that specifies the type of business they operate and their address. There may be more than one employer per type of business. Then estimate the number of employees in that business.

Ex.: **Answers will vary depending on where the student lives.**

Company's name	Type of business	Address	Estimated number of employees
	Bicycle repair shop		
	Motorcycle repair shop		
	Off-road vehicle repair shop		
	Auto repair shop		
	Heavy equipment repair shop		
	Farm vehicle repair shop		
	Industrial vehicle repair shop		
	Company of design and manufacture of tire		
	Others:		

4. If you worked in one of the businesses found above, how would you respond to a customer who asked you the following questions:

a) I drive a pickup truck with P235/75R17 105T tires and I would like to have a tire that is more resistant to loads when I pull a loaded trailer. What tires do you recommend?

I would recommend a LT235/75R17 light truck tire, as they are stronger with their reinforced sidewall. Generally, an LT tire is made with 10 plies on the sidewalls so they can handle a greater load. However, driving will be affected, as the stiffness and higher pressure of the tire will cause some discomfort on the road.

b) I have the option of purchasing used tires mounted on a wheel, but with a slightly larger diameter. What would be the effect on my vehicle if I installed these larger tires? (Considerations: gas mileage, mileage/odometer on vehicles, speedometer, safety aspect)

If the new sizes are listed in the manufacturer's possible sizes, a tire with a larger diameter will result in a smoother ride, as the tire overcomes road imperfections. However, the vehicle's odometer will increase more quickly because the vehicle's speed will be higher than with the original tires. Finally, a tire with a larger diameter will be safer because the contact area between the tire and the road will be larger than tires with a smaller diameter.

5. The tire industry is constantly evolving. There have been many technological innovations in recent years that allow vehicles to be safer and more efficient. Choose three technological innovations from recent years and present how these improvements make vehicles safer in a Google Slide or PowerPoint.

Here is a non-exclusive list of innovations you could choose from.

- a. TPMS,
- b. Nitrogen to inflate tires,
- c. Tweel
- d. Remote tire inflation
- e. Tire recycling,
- f. Tire wear and adhesion sensor
- g. Uptis tire
- h. Use of Sonja oil as an ingredient in tire rubber
- i. Run-flat tire
- j. Airless tires

Answers can vary

Appendix D – Activity Sheet - Answers can vary

WHEELS AND TIRES - IDENTIFICATION

NAME: _____

DATE: _____

TIRE IDENTIFICATION WORKSHEET:

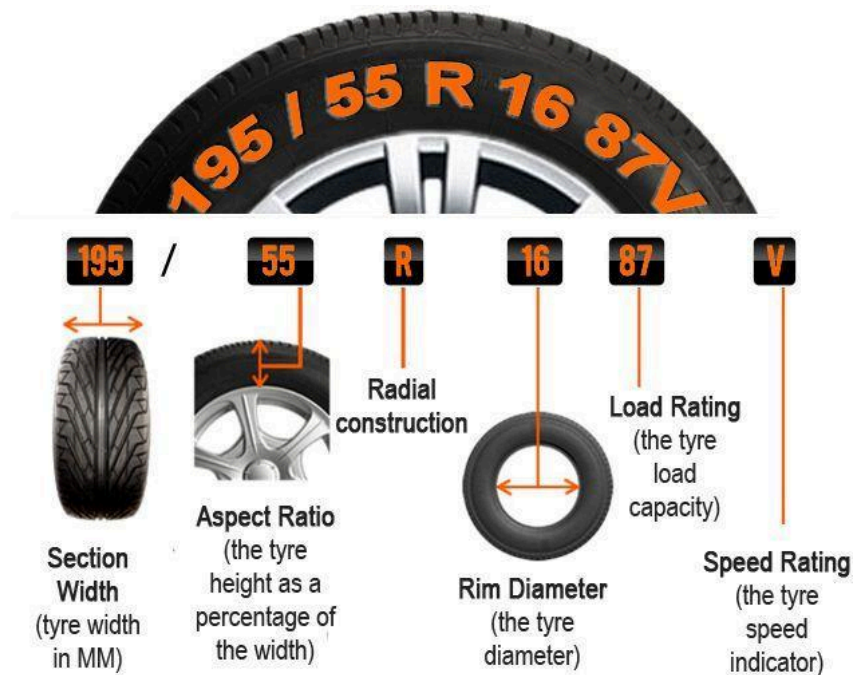
By the end of this Worksheet you will be able to:

- Identify the size of a tire
- Determine the type of tire wear
- Determine the proper torque to apply to wheel nuts
- Identify the rim size and the proper OEM inflation pressure

With the wide variety of motor vehicles and the ever-changing seasons, tire manufacturers have created many different styles and sizes to choose from. Choosing the correct tire for your vehicle is very important for safety, handling, and fuel economy.

The skill to choose the correct tire and identify abnormal wearing patterns is important for all drivers!

Use different Vehicles or Tires assigned to you in class to fill out the Identification Chart. Remember to **get permission** if this is not your vehicle and you are doing this from home!



Tire Identification Chart

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

Tire	Tire Manufacturer	Type	Width	Aspect Ratio	Diameter	Recommended Pressure	Tread Depth
1	Goodyear	M&S	235mm	60%	15 inches	35psi	8mm
2							
3							
4							
5							

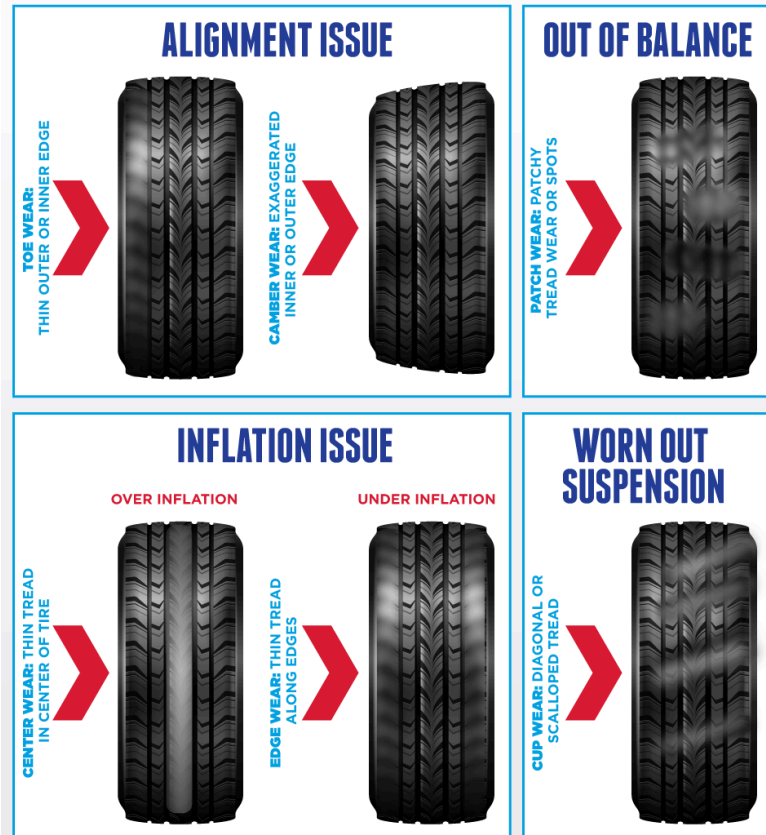
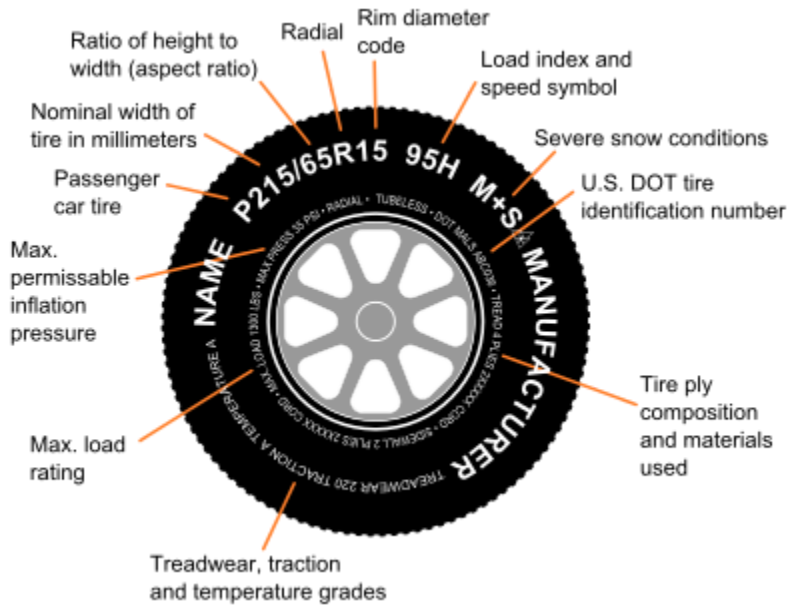


Note: A snowflake indicates a winter-type tire.

- At temperatures below _____ the rubber in summer compound tires gets too hard to offer any real traction.
- Some Winter tires also have the added benefit of _____ to help grip the snow and ice better.

MODULE- TIRE IDENTIFICATION

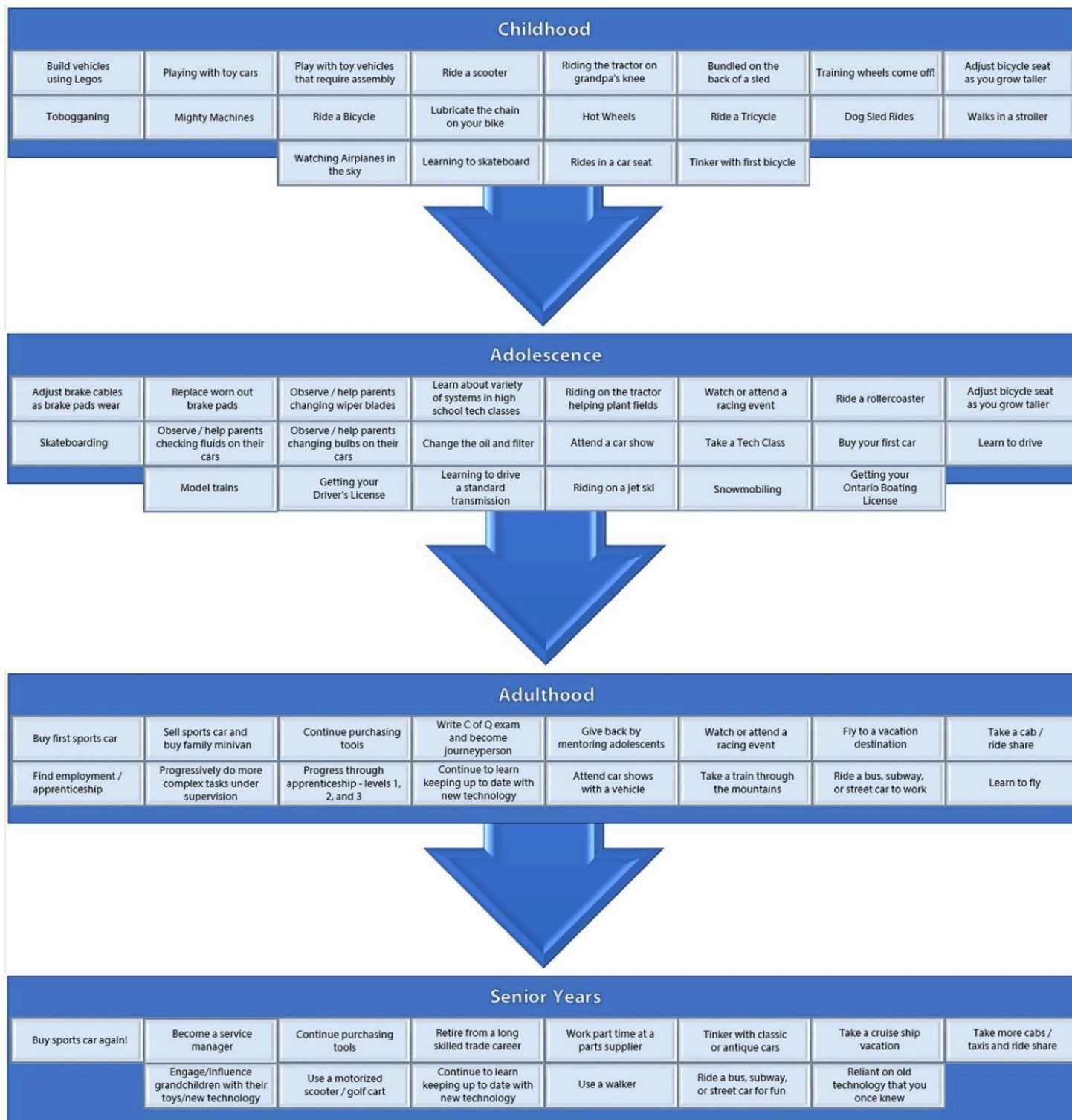
Tech Tip: You can use a ruler to measure tread depth in mm, wheel nut torque will only be listed in the owner's manual for the vehicle.



RESEARCH QUESTIONS

- 1) Why is tire tread depth so important?
- 2) What is the tire "bead"? What is its purpose?
- 3) What type of wear would occur if you had an over-inflated tire?
- 4) What type of wear would occur if you had an under-inflated tire?
- 5) In Ontario, what is the legal limit for tread depth?
- 6) Where can you find the "Wear-Bar" indicator?

Appendix E – Continuum of Influence



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