8

DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for TLE

Quarter 4
Lesson
5

Lesson Exemplar for TLE Grade 8
Quarter 4: Lesson 5 (Week 5)
SY 2025-2026

Development Team

Writer:
- Joan M. Daco (Vicente P. Trinidad National High School)

Validator:
- Victor S. Rosales, PhD (Mindanao State University-Iligan Institute of Technology)

Management Team

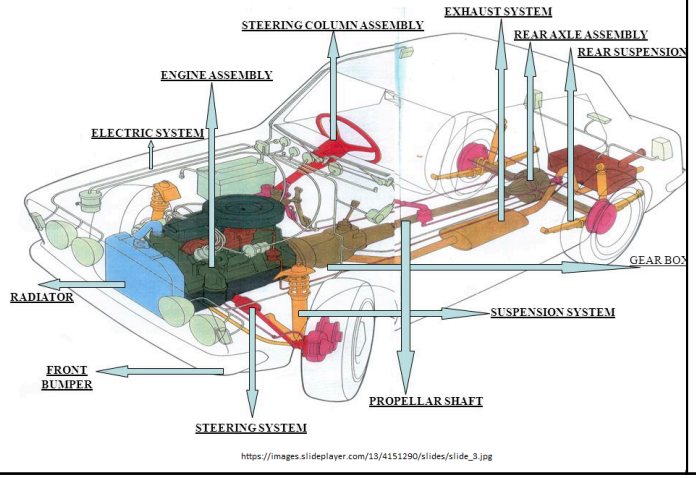
Philippine Normal University
Research Institute for Teacher Quality
SiMERR National Research Centre

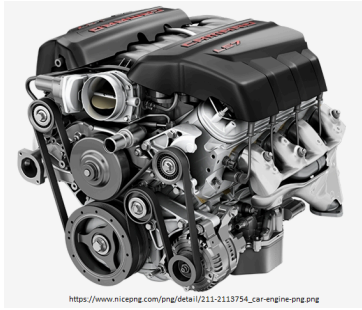
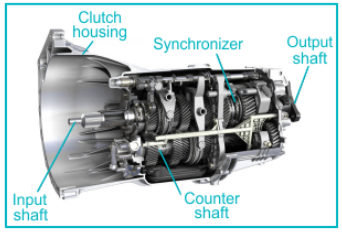
TLE/ QUARTER 4/ GRADE 8

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. **Content Standards**	Demonstrate an understanding of the consumables and component parts in industrial arts services.
B. Performance Standards	The learners perform simple diagnostics and simple troubleshooting in industrial arts services.
C. **Different Learning Competencies and Objectives**	**Lesson Objectives:** **1.** Identify the different parts of an automobile. Familiarize the function of each part. **2.** Identify the internal parts of a combustion engine. Familiarize the function of each part. **3.** Identify the different parts of an automobile's electrical, steering, and break systems. Familiarize the function of each part.
D. Content	Component Parts of Automobile and Small-Engine
E. Integration	**SDG 9:** Industry Innovation and Structures

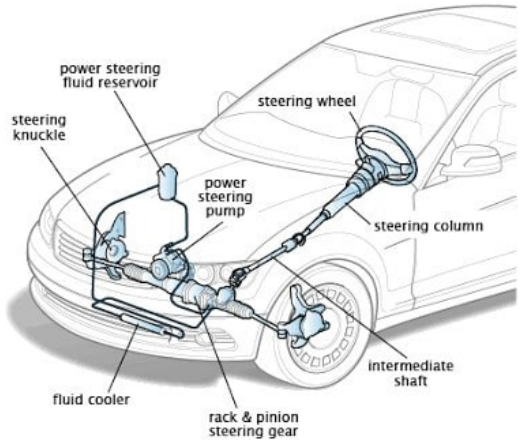
II. LEARNING RESOURCES
Sabhadiya, J. (2024, January 7). *40 Basic Parts of a Car Explain with Name & Diagram*. Engineering Choice. https://www.engineeringchoice.com/car-parts/ Waqar, E. (2023, March 25). *Internal Combustion Engine: working, types, parts, and applications*. Mechanical Boost. https://mechanicalboost.com/internal-combustion-engine/ *How car electrical systems work*. (n.d.). How a Car Works. https://www.howacarworks.com/basics/how-car-electrical-systems-work Jha, R. (2024, February 1). *Braking system in automobile - Types of brakes explained*. All About Buying & Selling of Used Cars, New Car Launches. https://www.cars24.com/blog/brake-system-in-cars/

III. TEACHING AND LEARNING PROCEDURE		**NOTES TO TEACHERS**
A. **Activating Prior Knowledge**	**DAY 1** **1. Short Review** The teacher will ask the students the composition and types of electric circuit. **2. Feedback (Optional)**	The teacher may also let the students draw on the blackboard a type of electric circuit and process the activity.

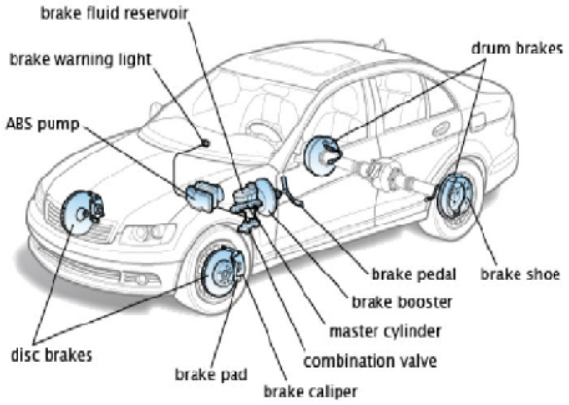
B. Establishing Lesson Purpose	**1. Lesson Purpose** Let the students answer the questions below. a. What are the different symbols you observe on your community? b. What is the importance of symbols on our daily lives? **2. Unlocking Content Vocabulary** ● **Automobile-**also known as a car or motorcar, is usually four-wheeled vehicle designed primarily for transportation. ● **Oscillating motion-** a repetitive back-and-forth movement around a central point or axis. ● **Transmission-** a mechanism responsible for transferring power from the engine to the wheels. ● **Steering-** the control of the a vehicle's direction.	
C. Developing and Deepening Understanding	**SUB-TOPIC 1: Anatomy of an Automobile** **1. Explicitation:** The teacher will ask the students about the type of automobile they know and process the following questions: a. How does the automobile work? b. What are the different parts of an automobile do you know? c. What are the functions of each part? d. Are these parts connected to each other? **2. Worked Example:** Automobile is a complex integration of various systems that work in harmony to provide transportation. At its core, an automobile consists of a chassis that supports all other components, including the engine, which is the heart of the vehicle. The transmission system transfer power from the engine to the wheels, enabling the movement. The suspension system absorbs shocks and maintains contact with the road, while the braking system ensures deceleration. The electrical system powers lights, sensors, and other electronic devices. Together, these  https://images.slideplayer.com/13/4151290/slides/slide_3.jpg	The teacher may show an illustration of an automobile and ask them the parts they know. The teacher may create a SHOW ME CARD, a picture of the automotive part in front and its function at the back. This will be used to facilitate the teaching process.

	systems form the intricate anatomy of an automobile. Let's explore the essential parts of an automobile: **a. Engine** is the heart of your automobile. It converts heat from burning fuel into the force that turns the road wheels. The engine consists of two main parts: the cylinder block (the lower, heavier section) and the cylinder head (the detachable upper cover. In most automobile engines, the explosive power of the air-fuel mixture drives the pistons, which turn a crankshaft connected to the wheels. Some cars use alternative engines like rotary valve engine or Wankel engine.  https://www.nicepng.com/png/detail/211-2113754_car-engine-png.png **b. Chassis** serves as the vehicle's main framework. It includes several components: Frame: the skeleton of the vehicle. Suspension System: Supports the weight of the car and provides a smooth ride. Axles: Connect the wheels to the chassis. Wheels: Allow the car to move.  https://qph.cf2.quoracdn.net/main-qimg-7f7bf0318ba712bb5285c5e87a765e6a.webp **c. Transmission System** is responsible for transferring the power from the engine to the wheels. It includes the gearbox, clutch, and driveshaft.  https://blogmedia.testbook.com/blog/wp-content/uploads/2023/09/manual-transmission-system-in-automobile-8a481beb.png **d. Body** is the outer shell of the car, which provides protection and houses passengers and cargo.  https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcR9oA2oH5vjvIwFoKp2-PqiaHq6BM0cU4SJD50-AechaH_Td3A-yp5GvY04qyhZh-Ksmx0&usqp=CAU	The teacher may also show a video about the different parts of an automobile. Magic Marks. (2013, December 3). *Basic structure of an automobile | Automobile Engineering* [Video]. YouTube. https://www.youtube.com/watch?v=c3CalfdYZYw CARinfo3d (En). (2022, October 10). *Car anatomy: The Basics / How cars work? (3D animation)* [Video]. YouTube. https://www.youtube.com/watch?v=fPjOWekzeGI

e. Steering System enables the driver to control the direction of the car.



https://learnmech.com/wp-content/uploads/2019/04/steering-system.jpg



https://toytechs.com/wp-content/uploads/2018/09/Automotive-Brake-System-image.jpg

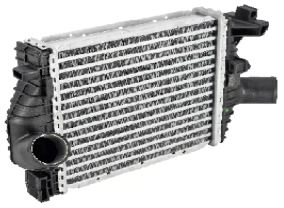
f. Braking System incudes components like brake pads, rotors, and calipers to slow down or stop the car.

g. Battery provides electrical energy to start the engine and power accessories.

https://5.imimg.com/data5/WL/PP/MY-9623917/electric-car-battery-500x500.jpg

https://www.valeo.com/wp-content/uploads/2023/06/2015_PES_Alternator_Leaders.png

h. Alternator generates electricity while the engine runs, charging the battery and powering electrical systems.

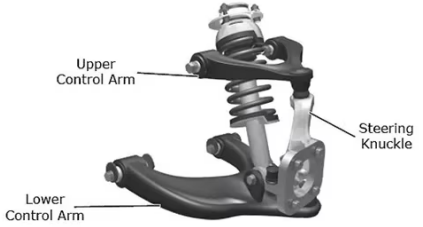


https://haynes.com/en-gb/sites/default/files/styles/unaltered_w

i. Radiator keeps the engine cool by dissipating heat.

j. Axle connects the wheels and transmits power from the transmission to the wheels.

k. Suspension ensures a comfortable ride by absorbing shocks and vibrations.



Short/long arm suspension

https://res.cloudinary.com/utiblog/image/upload/f_auto,q_auto/car-suspensions_embed3.webp

https://www.kamsiparts.com/wp-content/uploads/2021/12/shock-absorber.jpg

l. Shock Absorbers dampen vibrations and maintain stability.

m. Catalytic Converter reduces harmful emissions from the exhaust.

https://m.media-amazon.com/images/I/61tFD1g6DML.jpg

https://res.cloudinary.com/yourmechanic/image/upload/dpr_auto,f_auto,q_auto/v1/article_images/bad_or_failinf_muffler

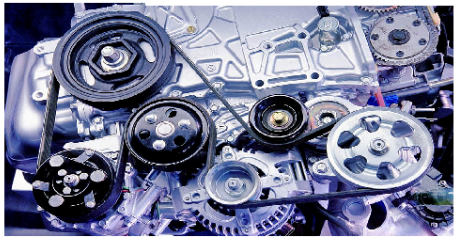
n. Muffler reduces noise produced by the exhaust system.

o. AC Compressor powers the air conditioning.

https://www.ultimatebimmerservice.com/wp-content/uploads/2019/06/Car-AC-Compressor-1200x675.jpg

p. Serpentine Belt drives various engine accessories.

https://m.media-amazon.com/images/I/51M4CMN0rEL._AC_UF1000,1000_QL80_.jpg



https://d2hucwwplm5rxi.cloudfront.net/wp-content/uploads/2021/09/09091810/Serpentine-Belt-090920210215-1024x640.jpg

https://cdn.jdpower.com/How%20Hot%20Does%20A%20Car%20Exhaust%20Pipe%20Get.jpg

q. Tailpipe releases exhaust gases from the engine.

r. Fuel Tank stores fuel for the engine.

https://m.media-amazon.com/images/I/7182SN2pR3L._AC_UF894,1000_QL80_.jpg

s. Windscreen (Windshield) provides visibility for the driver.

https://5.imimg.com/data5/WI/UX/MY-27928058/car-windshield-glass-500x500.jpg

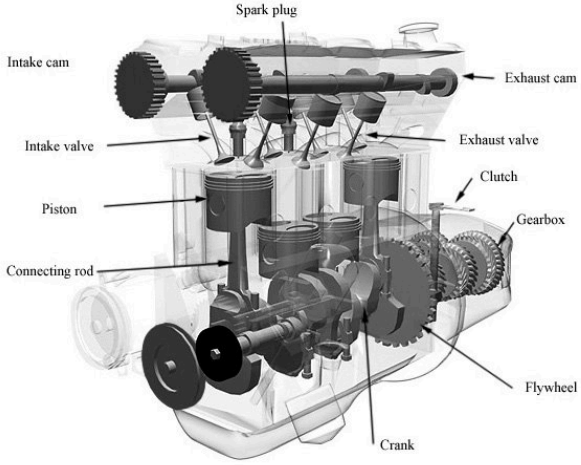
t. Windshield Wipers keep the windshield clean during rain or snow.

https://www.thesilverlining.com/hubfs/wiperblades.jpg#keepProtocol

3. Lesson Activity
Let the students accomplish Worksheet 1.

DAY 2
SUB-TOPIC 2: Parts of An Internal Combustion Engine

1. Explicitation
The teacher will play a video about combustion engines.
Animagraffs. (2021, March 13). How a car engine works [Video].



https://ic.carid.com/articles/how-does-internal-combustion-engine-work/automotive-internal-combustion-engine-components_0.jpg

Animagraffs. (2021, March 13). *How a Car Engine Works* [Video]. YouTube. https://www.youtube.com/watch?v=ZQvfHyfgBt

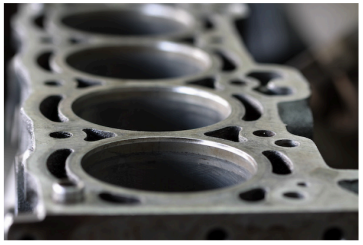
The teacher may also use other activities such as matching automotive parts' name and their functions.

YouTube. https://www.youtube.com/watch?v=ZQvfHyfgBtA

2. Worked Example

The combustion engine, a cornerstone of modern transportation, operates on the principle of internal combustion, a process where fuel and air are mixed and ignited to create an explosion within a cylinder. This explosion forces a piston to move, converting chemical energy into mechanical work. The efficiency of these engines is a focal point for engineers, as they seek to maximize power output while minimizing fuel consumption and emissions. Advancements in technology have led to significant improvements in engine design, resulting in cleaner and more efficient vehicles.

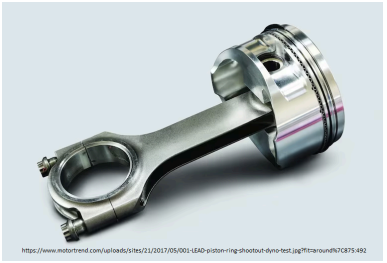
Let's delve into the essential internal components of a combustion engine.



https://www.broomfieldautorepair.com/Files/Images/AdobeStock_95719088.jpeg

a. Cylinder is a crucial part where the combustion process occurs. It houses the piston and provides the space for fuel combustion.

b. Piston moves up and down inside the cylinder. When fuel ignites, it pushes the piston, converting the pressure into mechanical work.



https://www.motortrend.com/uploads/sites/21/2017/05/001-LEAD-piston-ring-shootout-dyno-test.jpg?fit=around%7C875:492

https://5.imimg.com/data5/XI/SQ/MY-60315/crank-shaft-500x500.png

c. Crankshaft is connected to the piston, and transforms the reciprocating motion into rotary motion. It drives the wheels of the vehicles.

d. Cylinder Head is positioned at the top of the cylinder and contains valves, spark plugs, and other components.

https://bc9cf907821348e185b0-2f83861d2301ac6f0e581ba59b332a1d.ssl.cf1.rackcdn.com/AFR1001-large-557--v.jpg

The teacher may also show an illustration of an automobile engine and ask the students how it works. The teacher will then process each of the students answer.

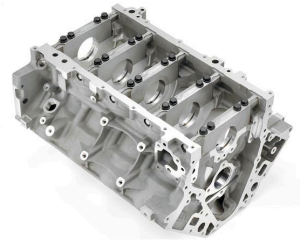
The teacher may create a SHOW ME CARD, a picture of the automotive part in front and its function at the back. This will be used to facilitate the teaching process.

https://www.eaton.com/content/dam/eaton/products/engine-solutions/engine-valves/eaton-engine-valves-grouped.jpg

e. Valves regulate the flow of air and fuel into the cylinder and allow exhaust gases to exit. There are two types: intake valves (for fuel-air mixture) and exhaust valves.

f. Connecting Rod links the piston to the crankshaft, transmitting motion between them.

https://www.motortrend.com/uploads/sites/21/2010/09/ctrp-1011-01-connecting-rods-.jpg

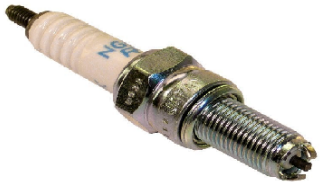


https://static.pakwheels.com/2017/10/Crankcase.jpg

g. Crankcase encloses the crankshaft and provides lubrication for moving parts.

h. Flywheel is attached to the crankshaft and stores rotational energy and helps maintain engine momentum.

https://www.engineersedge.com/mechanics_machines/images/flywheelfeatures.jpg



https://1.bp.blogspot.com/-E8-IpGzgsPc/Xci-zc5eqhI/AAAAAAABgk/5zpVUMfZFZE8jyK2nabESMZd9_WKEIW5wCLcBGAsYHQ/s1600/spark-plug_dual-electrode.jpg

i. Ignition System includes sparkplugs (for gasoline engines) or compression heating (for diesel engines) to ignite the air-fuel mixture.

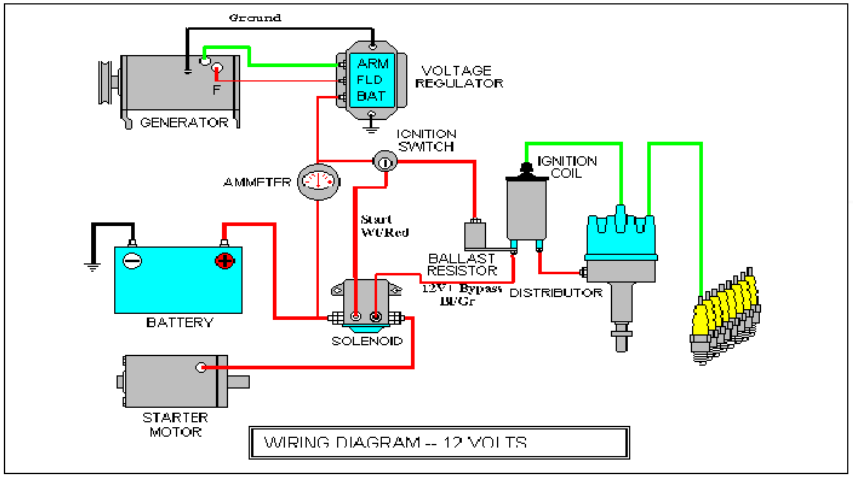
j. Cooling System is either air-cooled (using fins and airflow) or water-cooled (using a radiator) to dissipate heat.

https://s19528.pcdn.co/wp-content/uploads/2019/08/Radiator.jpg

3. Lesson Activity

The teacher may use the open educational resources (OER):

	Let the students identify the following internal parts of a combustion engine. 1.  2.  3.  4.  5.  **DAY 3** **SUB-TOPIC 3: Automotive Electrical, Steering, and Brake Systems** **1. Explicitation** The teacher will ask the students the following questions: a. How does a light bulb work? b. How does a bicycle stop? c. How does a scooter turn? **2. Worked Example:** The automotive **electrical system** is a complex network that powers various vehicle components, including the ignition system, lighting, sensors, and infotainment systems. It primarily consists of the battery, alternator, and wiring harnesses that distribute power to all electrical devices. The system's efficiency is crucial for the overall performance and reliability of the vehicle. Regular electrical system maintenance ensures optimal operation and longevity of automotive components.	Rinke, A. (n.d.). *Automotive electrical systems VAT-40 battery testing*. Wisc-Online OER. https://www.wisc-online.com/learn/career-clusters/transportation-distribution-and-logistics/amt5220/automotive-electrical-systems-vat-40-battery Rinke, A. (n.d.). *Automotive electrical systems: Ammeter circuit connections*. Wisc-Online OER. https://www.wisc-online.com/learn/career-clusters/transportation-distribution-and-logistics/amt3605/automotive-electrical-systems-ammeter-circuit Rinke, A. (n.d.). *Automotive electrical systems: The relay*. Wisc-Online OER. https://www.wisc-online.com/learn/career-clusters/transportation-distribution-and-logistics/amt3805/automotive-electrical-systems-the-relay Rinke, A. (n.d.). *Automotive electrical systems: VAT-40 starting system test*. Wisc-Online OER. https://www.wisc-online.com/learn/career-clusters/transportation-distribution-and-logistics/amt2004/automotive-electrical-systems-vat-40-starting Rinke, A. (n.d.). *Automotive electrical systems: Ohm's law*. Wisc-Online OER. https://www.wisc-online.com/learn/career-clusters/transportation



https://i.pinimg.com/originals/c9/57/f6/c957f66d68ed09dfa0670466234c998e.gif

Let's delve into the basics of how it operates.

a. Battery is the heart of the system, it supplies the electrical energy. Modern cars typically uses 12-Volt battery. Its capacity is measured in ampere-hour (amp/hours).

b. Circuits and Components

b.1. **Charging, Starting, and Ignition Circuits**

These are the main circuits. Additionally, there are other circuits that power various components such as lights, electric motors, sensors and gauges, heating elements, magnetically operated locks, radios and more.

b.2. **Switches and Relays**

These open and close circuits. Relays are remote switches operated by Electromagnets.

b.3. **Earth-Run System**

In a negative (-) earth-run system, current flows from the positive (+) Terminal to the operated component. The component is earthed to the car body, which connects to the negative (-) terminal battery of the battery.

c. Current, Voltage, and Resistance

Current (Amps) is the strength of the current flowing through the system.
Voltage (Volts) is the pressure driving the current.
Resistance (Ohms) is the extent to which a wire resists current flow.

d. Polarity

-distribution-and-logistics/amt2905/automotive-electrical-systems-ohms-law

Counterman. (2024, February 20). *Fundamentals of Automotive Electrical Systems* [Video]. YouTube. https://www.youtube.com/watch?v=17DdpIJ6IsI

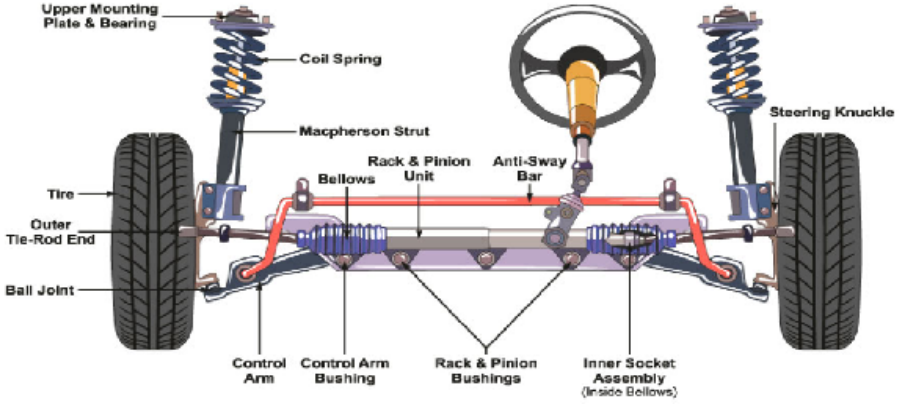
The Engineering Mindset. (2020, August 29). *How Alternators Work - Automotive Electricity Generator* [Video]. YouTube. https://www.youtube.com/watch?v=jdSKlg80DjU

Supplementary video for steering system:

Lesics. (2018, October 31). *Understanding your Car's Steering & Power Steering !* [Video]. YouTube. https://www.youtube.com/watch?v=em1O8mz7sF0

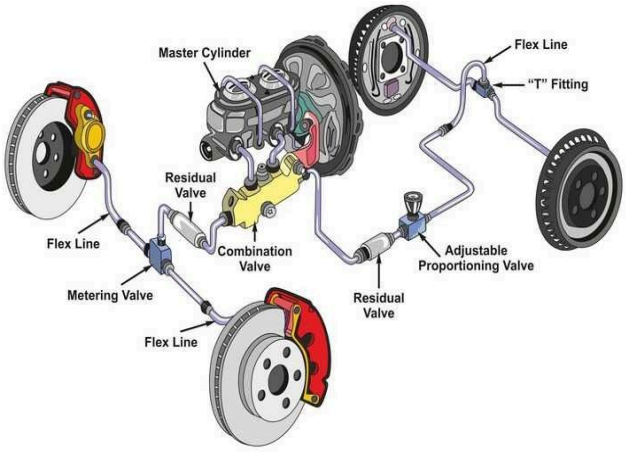
CNET. (2014, April 1). *Car Tech 101: Power steering explained* [Video]. YouTube. https://www.youtube.com/watch?v=o2kyozK9GII

Supplementary videos for brake system: Lesics. (2018, May 31). *Understanding Anti-lock Braking System (ABS) !* [Video]. YouTube.

	Electricity flows from a battery in one direction only. Some components Work only if the flow through them is in the correct direction. The automotive **steering system** is integral to any vehicle, designed to ensure precise control and maneuverability. It encompasses a range of parts, including the steering wheel, column, gear, linkage, and power steering mechanism. Modern systems are often equipped with power-assisted steering to reduce driver effort, enhancing comfort during operation. Regular steering system maintenance is crucial for safety and optimal performance, as it directly affects the vehicle's handling and response to driver inputs.  https://thors.com/wp-content/uploads/2023/11/rack-and-pinion-steering.jpg Basic Components **a. Steering Wheel**: The driver interacts with the steering wheel, initiating the steering process. **b. Steering Column**: A shaft that connects the steering wheel of a vehicle to the rest of the steering mechanism. **c. Steering Gearbox**: Attached to the end of the steering column, the gearbox converts the rotary motion of the wheel into an oscillating motion. **d. Cross Shaft**: Is used to connect misaligned intersecting shafts. It transmits rotational motion from one shaft to another. **e. Drop Arm**: Is connected to the cross shaft and transmits motion. **f. Drag Link**: Serves as the link between the drop arm and the steering arms. **g. Steering Arms and Tie Rods**: Connect the steering arms on both wheels. **Types of Steering Systems** **a. Bicycle Steering**: Simplest form, where the front wheel pivots around a vertical axis. **b. Turntable Steering (Center Pivot)**: Used in slow-moving vehicles (e.g. forklifts)	https://www.youtube.com/watch?v=98DXe3uKwfc The Engineers Post. (2020, December 18). *How Braking System Works in Automobiles? & Types of Brakes* [Video]. YouTube. https://www.youtube.com/watch?v=a5tcMhEWhsU Bendix Brakes. (2019, July 22). *How car brakes work* [Video]. YouTube. https://www.youtube.com/watch?v=KJ0koDXk6PY The teacher will process the activity leading to the topic. The teacher may create a SHOW ME CARD, a picture of the automotive part in front and its function at the back. This will be used to facilitate the teaching process.

c. Ackermann Steering (Side Pivot): Commonly used in automobiles, ensuring all wheels follow different paths during turns.

The automotive **brake system** is a critical safety component in any vehicle, designed to enable the driver to reduce speed or bring the vehicle to a complete stop. This system comprises several key parts, including the brake pedal, master cylinder, brake lines, brake pads, and rotors. When the brake pedal is pressed, hydraulic fluid is pushed through the brake lines, causing the brake pads to clamp onto the rotors, which slows down the wheel's rotation and, consequently, the vehicle itself. Regular maintenance of the brake system is essential for ensuring its optimal performance and the safety of passengers.

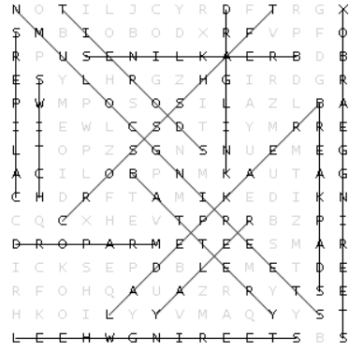


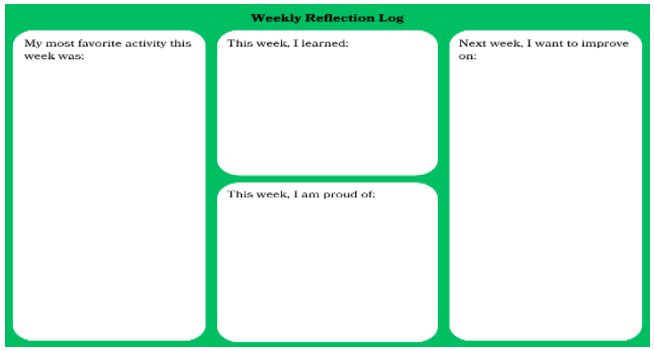
https://assets.cars24.com/production/blog-in-cms/Brake-System-In-Automobile-6c64d16dbe.jpg

a. Brake Pedal is an essential component of a vehicle's braking system, enabling the driver to slow down or stop the vehicle by applying pressure to the pedal. This action activates the brake mechanism, which in turn reduces the speed of the vehicle. It is crucial for the brake pedal to be responsive and reliable for safe driving.
b. Master Cylinder serves as the main valve that pushes brake fluid through the brake lines, enabling the brake pads to clamp onto the rotors and bring the vehicle to a stop.
c. Brake Lines are responsible for carrying brake fluid from the master cylinder to the brakes at each wheel, ensuring reliable and responsive braking performance.
d. Brake Calipers house the brake pads and pistons, which apply pressure to the brake rotors, thus slowing down or stopping the vehicle.
e. Brake Pads/ Shoes provide the friction needed to slow and stop the car when pressure is applied to the brake pedal.

3. Lesson Activity
Let the students accomplish Worksheet 2

Answer key:
(Lesson Activity)



D. Making Generalizations	**1. Learners' Takeaways** What is an automotive system? What are the parts of an automotive internal combustion engine? What are the parts of an automotive steering system? What are the parts of an automotive brake system? **2. Reflection on Learning** The students will accomplish the weekly reflection log. 	

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		**NOTES TO TEACHERS**
A. Evaluating Learning	**1. Formative Assessment** **Multiple choice Quiz**: Students will take the 10-item test. 1. What part of an automobile converts heat from burning fuel into the force that turns the road wheels? A. alternator B. body C. chassis D. engine 2. This provides electrical energy to start the engine and power accessories. A. battery B. engine C. fuel tank D. radiator 3. The dashboard of a vehicle shows that the engine temperature is rising. What pat of the vehicle should be checked? A. battery B. engine C. fuel tank D. radiator 4. What part of a combustion engine houses the piston and provides space for fuel combustion? A. crankshaft B. cylinder C. flywheel D. valve 5. This regulates the flow of air and fuel into the cylinder and allows exhaust gases to exit. A. crankshaft C. flywheel B. cylinder head D. valve 6. Which of the following is positioned at the top of the cylinder and contains valves, spark plugs and other components? A. crankshaft C. flywheel	**Answer key:** 1. D 2. A 3. D 4. B 5. D 6. B 7. C 8. C 9. C 10. D

<table>
<tr><td></td><td colspan="3">B. cylinder head D. valve
7. This automotive system powers various components of a vehicle, including ignition system, lighting, sensors and infotainment system.
A. AC system B. breaking system C. electrical system D. steering system
8. What part of a steering system is attached to the end of the steering column and converts rotary motion of the wheel into oscillating motion?
A. cross shaft B. drop arm C. steering gearbox D. steering wheel
9. Which of the following components of a vehicle's breaking system enables the driver to slow down to stop the vehicle by applying pressure to it?
A. break calipers B. break pad C. break pedal D. master cylinder
10. This serves as the main valve that pushes break fluid through the break lines, enabling the break pads to clamp onto the rotors and bring the vehicle to stop.
A. break calipers B. break pad C. break pedal D. master cylinder

2. Homework (Optional)</td><td></td></tr>
<tr><td rowspan="5">B. Teacher's Remarks</td><td>Note observations on any of the following areas:</td><td>Effective Practices</td><td>Problems Encountered</td><td rowspan="5">The teacher may take note of some observations related to the effective practices and problems encountered after utilizing the different strategies, materials used, learner engagement and other related stuff.

Teachers may also suggest ways to improve the different activities explored/ lesson exemplar.</td></tr>
<tr><td>strategies explored</td><td></td><td></td></tr>
<tr><td>materials used</td><td></td><td></td></tr>
<tr><td>learner engagement/ interaction</td><td></td><td></td></tr>
<tr><td>others</td><td></td><td></td></tr>
<tr><td>C. Teacher's Reflection</td><td colspan="3">Reflection guide or prompt can be on:
▪ <u>principles behind the teaching</u>
What principles and beliefs informed my lesson?
Why did I teach the lesson the way I did?

▪ <u>students</u>
What roles did my students play in my lesson?
What did my students learn? How did they learn?

▪ <u>ways forward</u>
What could I have done differently?
What can I explore in the next lesson?</td><td>Teacher's reflection in every lesson conducted/ facilitated is essential and necessary to improve practice. You may also consider this as an input for the LAC/Collab sessions.</td></tr>
</table>