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Кафедра иностранных языков

Essential steps to understanding technical terms: automotive domain. Part II:
учебное пособие по обучению иноязычной профессионально ориентированной лексике на основе поликодовых текстов для студентов специальностей 6-05-0715-07 «Эксплуатация наземных транспортных и технологических машин и комплексов» (профилизации – «Техническая эксплуатация автомобилей», «Автосервис»)

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Рецензенты:
заведующий кафедрой немецкой филологии и лингводидактики УО «Брестский государственный университет им. А. С. Пушкина», кандидат филологических наук, доцент О. Л. Зозуля
заведующий кафедрой иностранных языков УО «Брестский государственный технический университет», кандидат филологических наук, доцент В. И. Рахуба

Прокопюк О. В.

П80 Essential steps to understanding technical terms: automotive domain: учебное пособие по обучению иноязычной профессионально ориентированной лексике на основе поликодовых текстов / О. В. Прокопюк. – Брест издательство БрГТУ, 2023. – 76 с.

Пособие адресовано студентам 1 курса специальности 6-05-0715-07 «Эксплуатация наземных транспортных и технологических машин и комплексов» (профилизации – «Техническая эксплуатация автомобилей», «Автосервис»). В учебном пособии реализуются положения когнитивного и компетентностного подходов, а также технологии контекстного обучения.

Пособие составлено в соответствии с требованиями учебной программы «Иностранный язык (английский)» для студентов указанных специальностей дневной, заочной полной и заочной, интегрированной со средним специальным образованием, форм получения высшего образования.

Основной целью данного пособия является формирование готовности студентов к решению профессиональных задач с помощью иноязычных терминов, ключевых для области технической эксплуатации автотранспортных средств. Тематика текстового материала определена программой подготовки специалистов инженерного профиля. Издается в 2-х частях. Часть 2.

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Рекомендации по использованию в образовательном процессе пособия «Essential steps to understanding technical terms: automotive domain. Part II»

Пособие “Essential steps to understanding technical terms: automotive domain. Part II» адресовано студентам 1 курса специальности 6-05-0715-07 «Эксплуатация наземных транспортных и технологических машин и комплексов» (профилизации – «Техническая эксплуатация автомобилей», «Автосервис»). В учебном пособии реализуются положения когнитивного и коммуникативно-когнитивного подходов, а также технологии контекстного обучения. Основной *целью* данного пособия является формирование готовности студентов к решению профессиональных задач с помощью иноязычных терминов, ключевых для области технической эксплуатации автотранспортных средств. Кроме того, данное пособие направлено на развитие поликультурной профессиональной языковой личности студента. Достижение поставленных целей осуществляется посредством комплекса заданий, направленных на овладение студентами профессионально ориентированной лексикой на основе использования поликодовых текстов.

Темы разделов соответствуют учебной программе дисциплины «Иностранный язык» для данных специальностей. Пособие состоит из 5 разделов (Units): «Fuel System», «Transmission», «Cooling System», «Electrical System» и «HVAC System». Разделы пособия имеют схожую структуру: каждый из них включает 6 подразделов: вводный (Introduction) и пять тематических подразделов (Lessons). В каждом из тематических подразделов система автотранспортного средства рассматривается в одном их пяти аспектов: устройство и работа системы; профилактическое техническое обслуживание; возможные неисправности; сравнение характеристик системы / компонентов системы различного типа; история создания системы / компонентов системы.

В пособии используются поликодовые тексты, которые были созданы автором на образовательной платформе Genially. Функциональные возможности данной платформы позволяют предъявлять изучаемый термин в полимодальном формате: визуализировать графическую и звуковую формы термина и его значение с помощью вербального, образного и аудиовизуального блоков поликодового текста; демонстрировать аутентичные специализированные тексты в цифровом виде фрагментарно или целиком; предъявлять симуляции работы систем, узлов и деталей автотранспортных средств; демонстрировать особенности объектов профессиональной деятельности и специфику их функционирования, а также контексты будущей профессиональной деятельности. Поликодовое представление лингвистический и профессиональной информации позволяет развивать познавательную и профессиональную

мотивацию студентов путем их «погружения» в предметный и социальный контексты профессиональной деятельности.

В вводном подразделе (Introduction) представлены задания, направленные на осознание студентом графической и звуковой форм термина, его значения и ассоциативных связей с другими лексическими единицами. Выполняя задания, студент самостоятельно осуществляет поиск лексических языковых средств для наполнения содержанием элементов графического организатора «Term Dimensions» (см. рисунок 1).

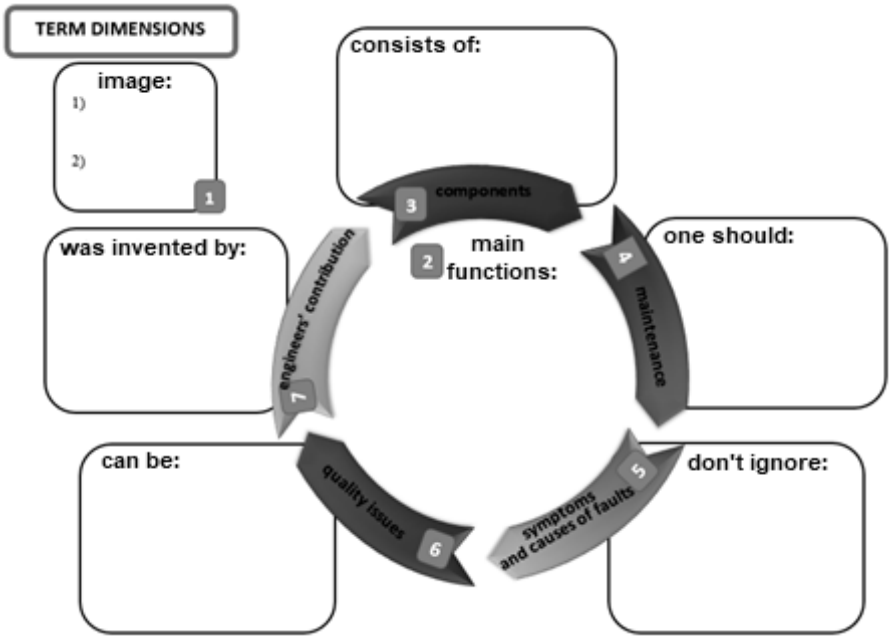


Рисунок 1 – Графический организатор «Term Dimensions»

Согласно заданию, студент анализирует поликодовый текст, извлекает из него лексические языковые средства и фиксирует их в графическом организаторе, что способствует более прочному запоминанию термина и ассоциируемых с ним лексических единиц. Кроме того, личностная вовлеченность студента в проблемно-исследовательскую деятельность по заполнению графического организатора «Term Dimensions» как личностного образовательного продукта делает процесс овладения профессионально ориентированной лексикой значимым и мотивированным для каждого из обучающихся, развивает познавательную и профессиональную мотивации студента.

На первой странице каждого поликодового текста размещена инструкция для студентов по работе с текстом (см. рисунок 2), поясняющая последовательность работы, а также описывающая навигационный аппарат, т. е. функции интерактивных кнопок и знаков-символов.

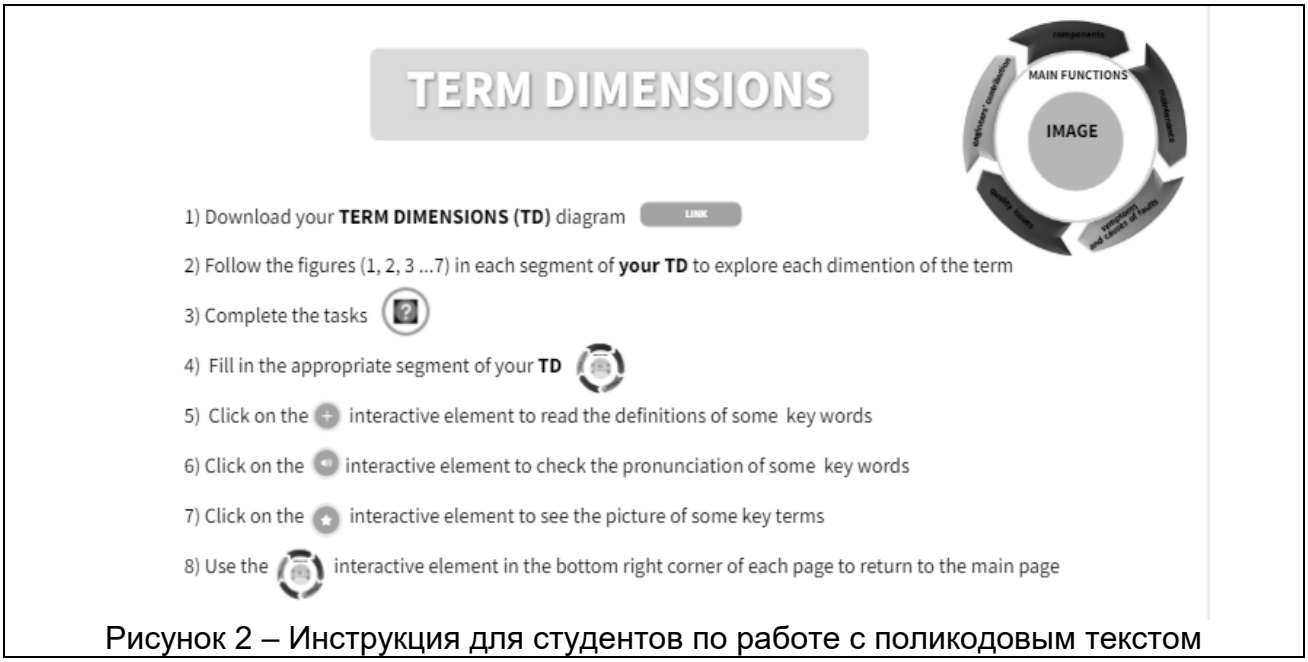


Рисунок 2 – Инструкция для студентов по работе с поликодовым текстом

Так, вначале студентам предлагается скачать шаблон графического организатора «Term Dimensions». На первом занятии преподавателю необходимо познакомить студентов со структурой данного графического организатора и объяснить правила наполнения его лексическими языковыми средствами: отдельными терминами, глагольными словосочетаниями и т. д.

Данные лексические средства извлекаются студентом из поликодового текста в результате выполнения им аналитических заданий. Задания и примеры их выполнения размещены на каждой интерактивной странице поликодового текста. Название каждого элемента графического организатора соответствует номеру интерактивной страницы поликодового текста, представленного на Genially. Например, на странице поликодового текста «Braking system» (Part 1) в верхнем левом углу находится знак-символ красного цвета, на котором указан номер и название интерактивной страницы (3 components). Идентичный знак-символ расположен в основании элемента графического организатора, который студент должен заполнить, выполнив задание на интерактивной странице поликодового текста (см. рисунок 3).

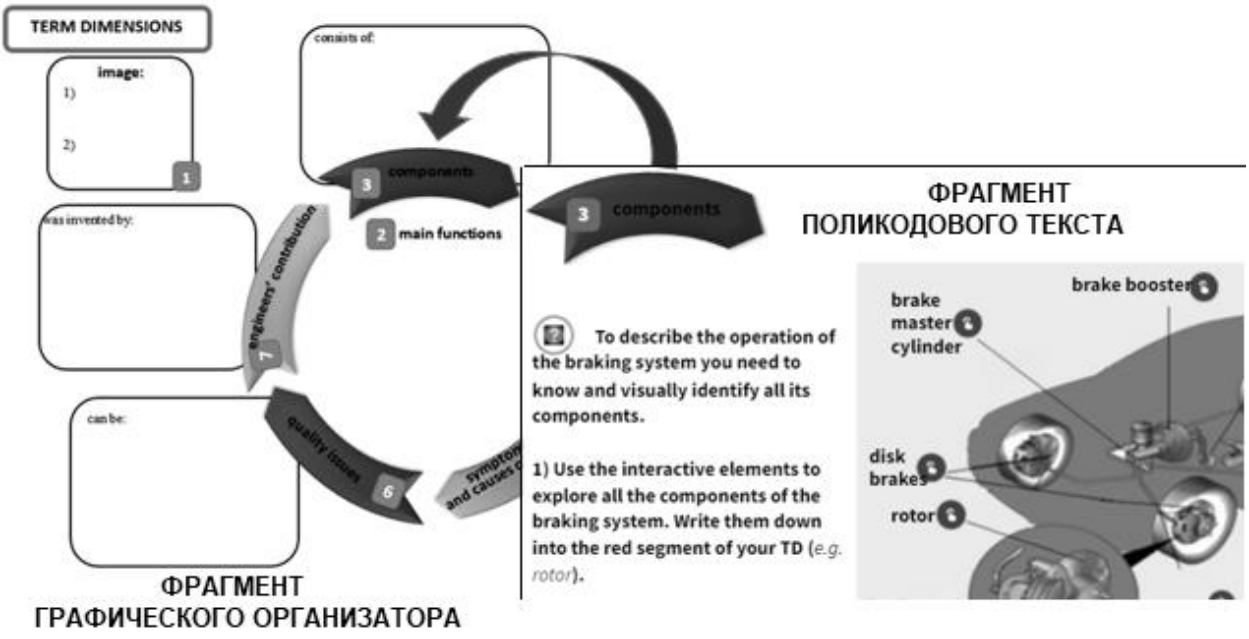


Рисунок 3 – Соответствие знаков-символов в поликодовом тексте и графическом организаторе

Анализируя поликодовый текст на каждой из интерактивных страниц, студент овладевает графической и звуковой формами термина, понимает его значение, а также осознает наличие различных ассоциативных (синтагматических, парадигматических и тематических) связей между термином и другими единицами лексической системы. Иными словами, студент знакомится с возможным лексическим окружением термина в речевом сообщении как компоненте профессиональной коммуникативной ситуации. Например, в области технической эксплуатации автотранспортных средств к данным ситуациям можно отнести выявление и анализ причин возникновения отказов и неисправностей агрегатов, узлов, деталей средств технического обслуживания, диагностирование и ремонт автотранспортных средств. В данных профессиональных коммуникативных ситуации речевое сообщение специалиста выполняет следующие функции: описание особенностей функционирования узлов, деталей автотранспортных средств; описание неисправностей; обсуждения причин отказа узлов, деталей автотранспортных средств; консультирование рабочих автотранспортной организации по вопросам профилактического технического обслуживания автотранспортных средств; описание неисправности и её причин; изложение возможных способов ремонта оборудования и мер по предупреждению его отказа; аргументирование специалистом своего выбора оптимальных материалов для организации профессиональной деятельности и т. д.

Графический организатор «Term Dimensions», наполненный студентом лексическими языковыми средствами, является ориентировочной основой, на которую должен опираться обучающийся, выполняя задания

в каждом тематическом подразделе под названием «Lesson». Задания тематических подразделов пособия ориентированы на укрепление структурных связей между значением термина и его графической / звуковой формой в рецептивных видах речевой деятельности: 1) поиск студентом определенных терминов в тексте / списке терминов; 2) расположение терминов в порядке, представленном в аудиозаписи; 3) обозначение компонентов объекта профессиональной деятельности на рисунке; 4) соотнесение рисунков и фрагментов аудиозаписей.

В тематических подразделах большое значение придается усилению ассоциативных связей между термином и его лексическим окружением в языковом сознании студента. На это направлены задания на восстановление именных и глагольных словосочетаний, восстановление скриптов профессиональных видео обзоров, подбор синонимов, исправление неверных утверждений. После этого студенты переходят к выполнению заданий, которые направлены на расширение ассоциативных связей терминов в процессе их использования в устной и письменной речи и предусматривают описание обучающимся симуляций работы систем, узлов и деталей автотранспортных средств, создание инфографиков, инструкций, презентаций и временных шкал.

В тематических подразделах студенты знакомятся и с профессиональными коммуникативными ситуациями, которые являются компонентами видов и подвидов профессиональной деятельности, в которых согласно образовательным стандартам высшего образования на первой ступени специальностей 6-05-0715-07 «Эксплуатация наземных транспортных и технологических машин и комплексов» (профилизации – «Техническая эксплуатация автомобилей», «Автосервис») должны быть компетентны выпускники учреждений высшего образования технического профиля.

Работа с пособием предполагает аудиторные групповые занятия под руководством преподавателя, а также самостоятельную работу студента во внеаудиторное время.

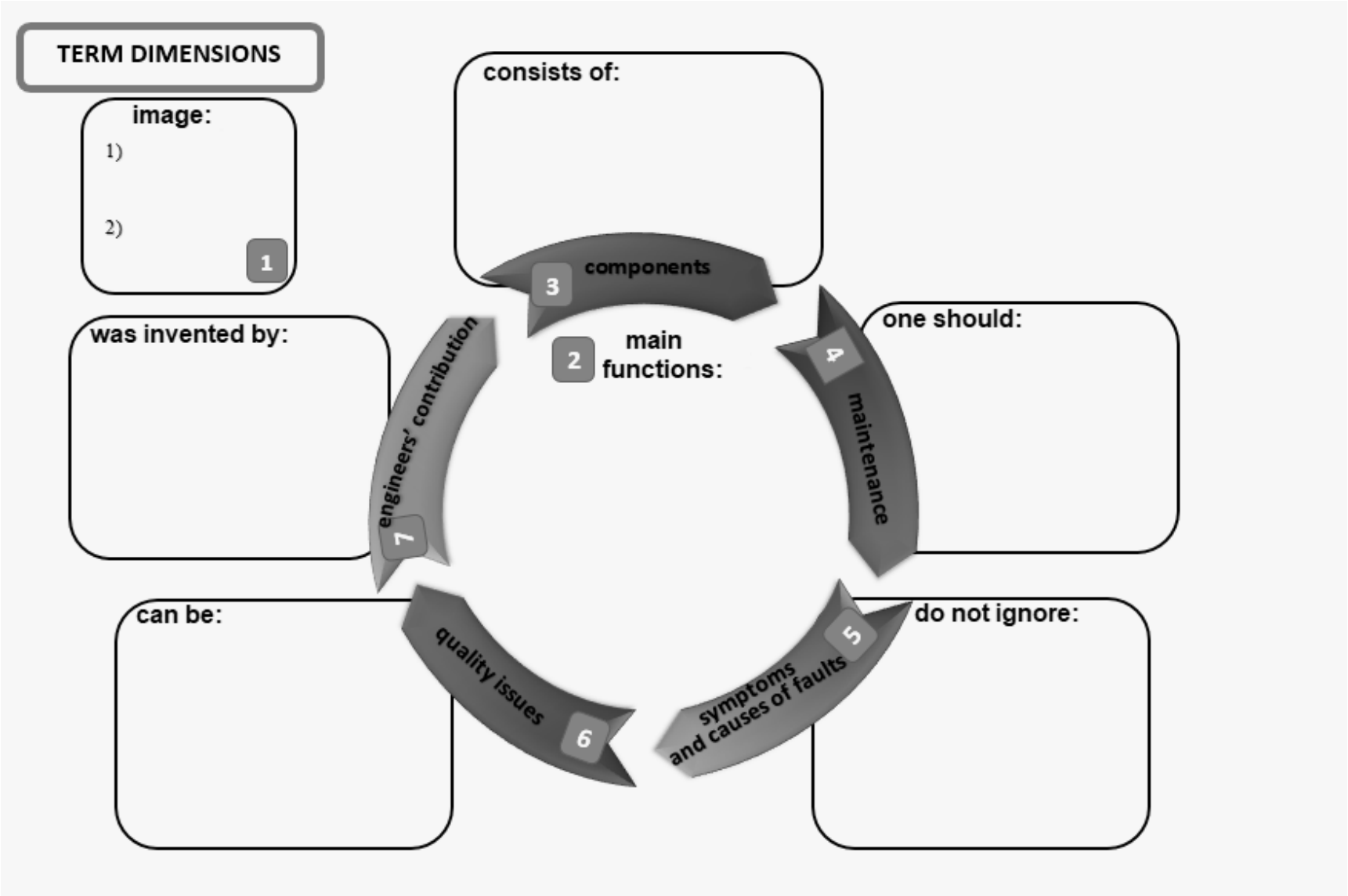


Рисунок 4– Графический организатор «Term Dimensions»

UNIT 1. FUEL SYSTEM

Introduction

Introductory Tasks. *Follow the link https://tinyurl.com/m9cytewj to complete tasks 1-6 or use the QR-code:*

Follow the link https://tinyurl.com/vwyvdb9n to download the Term Dimensions file or use the QR-code:

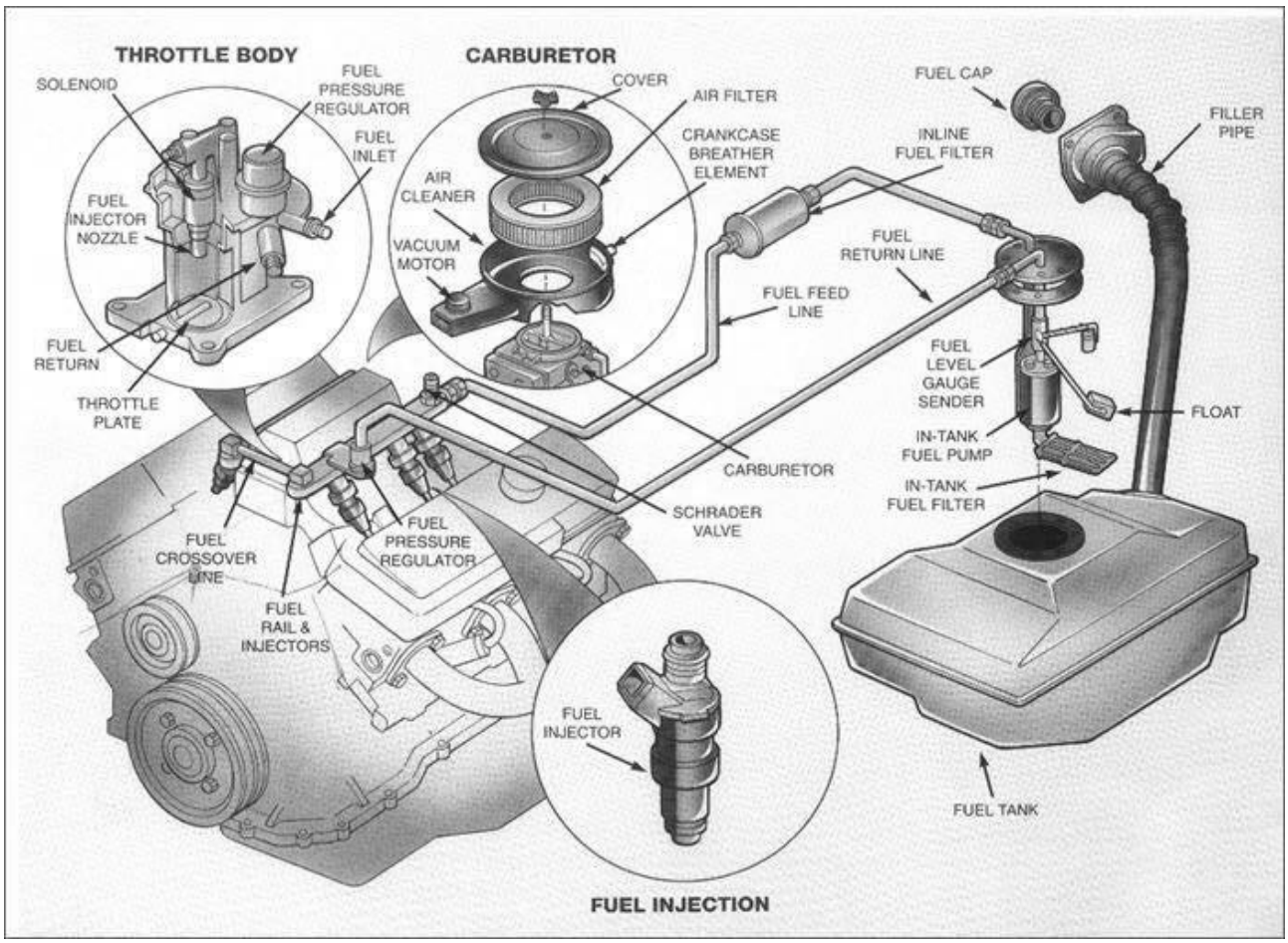
Lesson 1. FUEL SYSTEM

Task 1.1 *As an automotive engineer, you should know how the fuel system operates. Read the text below and underline the terms that denote the components of the fuel system. Add the missing terms to your TD.*

TIP! Follow the link to read the text "FUEL SYSTEM" on Clilstore: *multidict.net/cs/11455* ***or use the QR-code:***

FUEL SYSTEM

The fuel is stored in the fuel tank of the vehicle. The tank is designed to be safe and secure; it is often located at the rear of the vehicle. When the engine is running, the fuel is drawn from the tank by the fuel pump. The fuel pump creates the necessary pressure to overcome the resistance in the fuel lines and pushes the fuel toward the engine. In older vehicles and some smaller engines, this fuel pump may be mechanical, driven by the engine's motion. In modern vehicles, electric fuel pumps are commonly used.



The fuel passes through a fuel filter, which is located between the fuel pump and the engine. The fuel filter removes contaminants, such as dirt and debris, from the fuel to ensure that only clean fuel reaches the engine. This helps protect the fuel injectors and other fuel system components.

From the fuel filter, the fuel travels through the fuel lines, which connect the various components of the fuel system. The fuel lines are designed to withstand the pressure and corrosive properties of the fuel.

The fuel reaches the fuel rail, which is a pipe or manifold that distributes fuel to the individual fuel injectors. The fuel rail is mounted on the engine and is under constant pressure.

Each fuel injector is responsible for delivering fuel to a specific cylinder of the engine. The fuel injectors spray a precisely measured amount of the fuel into the intake manifold or directly into the combustion chamber, depending on the type of the fuel injection system used.

In older cars, the fuel system utilized a device known as a carburetor to mix air and fuel before they reached the engine for combustion. Let's focus on the operation of a carburetor. It is responsible for mixing the incoming air and fuel in the correct proportions. The carburetor consists of several components, including a venturi, a throttle plate, and various metering circuits. As air flows into the carburetor, it passes through the venturi, a narrow section in the carburetor's throat. The venturi creates a low-pressure area, which draws fuel

from the carburetor's fuel bowl through a nozzle called the main jet. The amount of fuel flowing through the main jet is regulated by the position of the throttle plate. The throttle plate controls the airflow into the engine and is connected to the accelerator pedal. When the driver presses the accelerator pedal, the throttle plate opens, allowing more air into the engine, which increases the engine's power and speed. The fuel and air mix together in the venturi and create a fine mist of atomized fuel. This mixture then enters the intake manifold and is distributed to each cylinder of the engine through individual intake ports. In the intake manifold, the air-fuel mixture continues its journey toward the combustion chamber.

At this stage, the mixture may pass through a throttle body in fuel-injected systems. The throttle body acts as a gateway to the intake manifold and is equipped with a throttle plate similar to the one found in a carburetor.

In fuel-injected systems with a throttle body, the throttle plate is controlled electronically by the Engine Control Unit (ECU) based on driver input. It monitors various inputs from sensors such as the throttle position sensor, oxygen sensor, and engine speed sensor. Based on these inputs, the ECU calculates the ideal fuel delivery requirements. The ECU controls the opening and closing of the fuel injectors through electrical signals. It adjusts the timing and duration of fuel injection to deliver the correct amount of fuel for efficient combustion.

The fuel-air mixture is then drawn into the engine's cylinders during the intake stroke. The air-fuel mixture is ignited by the spark plugs, resulting in combustion. Any excess fuel that is not used during combustion is returned to the fuel tank through a fuel return line. This ensures a continuous flow of fuel and helps regulate fuel pressure within the system.

By precisely controlling the fuel delivery based on the engine's requirements, the fuel system ensures that the correct amount of fuel is delivered to the engine for optimal performance and efficiency.

It's important to note that the specific design and operation of fuel systems can vary depending on the type of engine, fuel injection system, and vehicle make and model.

Task 1.2a *To explain how a fuel system works, you need to know the terms, which denote the components involved in its operation.*

Look over the list of automotive terms. Circle the terms referring to the fuel system.

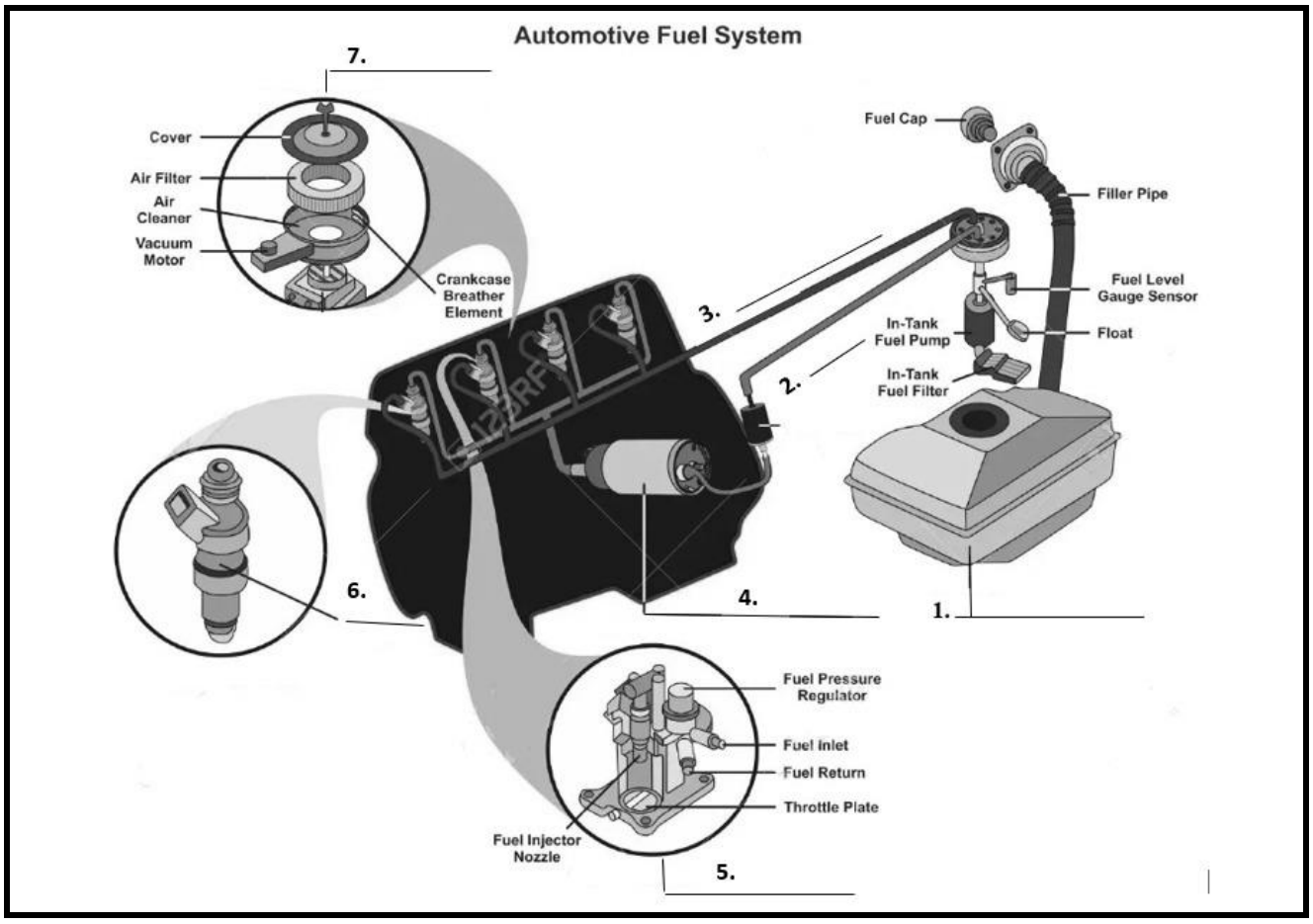
A tank, a pump, a fuel filter, a calliper, an injector, a fuel rail, a strut, a throttle body, tie-rods, a fuel pressure regulator, a rotor, contact-breaker points, a fuel pressure sensor, fuel lines, a fuel return line, a radiator.

Task 1.2b *Put the following terms in the order you hear them:*

TIP! Follow the link to listen to the list of the terms *https://tinyurl.com/wyv8ddrf* ***or use the QR-code:***

A fuel filter, a fuel injector, fuel lines, a fuel feed line, a fuel pressure regulator, a fuel level gauge sensor, a fuel pressure sensor, a carburetor, a fuel pump, a fuel rail, a fuel return line, a fuel tank, a throttle body.

Task 1.2c *Label the unmarked fuel system parts in the picture using the information from the text (see Task 1.1) and your TD:*



Task 1.3 *Use the information in the text (Task 1.1) and your TD to restore the phrases that can help you describe the operation of the fuel system:*

a) NOUN + tank / pump / lines / filter / rail / injectors;

b) the fuel+ NOUN + creates the necessary pressure;

c) the fuel + NOUN + removes contaminants;

d) the fuel + NOUN + distributes fuel;
e) the fuel + NOUN + delivers fuel to a specific cylinder;
f) the + NOUN + NOUN + NOUN + monitors various inputs from sensors;
g) the + NOUN + NOUN + NOUN + controls the opening and closing of the fuel injectors;
h) the + NOUN + NOUN + ensures that the correct amount of fuel is delivered to the engine.

Task 1.4a *Watch a professional review and restore its script by filling in the gaps with the verbs / verb forms describing the actions of the fuel system parts.*

TIP! Follow the link to watch the review *https://tinyurl.com/3pr8pcu6* ***or use the QR-code:***

A fuel pump is a mechanically or electrically 1**.**_____ mechanism that 2**.**_____ fuel from the gas tank through the fuel filter to the fuel rail. From there, fuel is 3**.**_____ to the injectors and sprayed into each engine cylinder combustion chamber. On older vehicles, the pump 4**.**_____ fuel to a carburetor. An electric fuel pump, generally located inside the tank, clicks on when you start the engine, and the vehicle's ECM 5**.**_____ the fuel pump relay to turn it on. You may hear its telltale whirring sound. The pump 6**.**_____ the fuel and 7**.**_____ it through the piping. When the fuel pump is 8**.**_____ well, your engine will 9**.**_____ quickly and 10**.**_____ with remarkable enthusiasm. With insufficient fuel, your engine will 11**.**_____ very poorly. When no fuel is 12**.**_____, your engine will suddenly 13**.**_____ and will not 14**.**_____ until pumping is restored.

Task 1.4b *Add the verbs you inserted (Task 1.4a) to your TD. Connect them and the fuel system components (from the blue segment of your TD) performing the actions these verbs describe.*

Task 1.5a *Replace the underlined verbs, which denote the actions of the fuel system parts, with their synonyms using the following list of words:*

dispense	manage	withdraw	hold	transport
control	assess	eliminate	eject	send back

1. A fuel tank stores the fuel until it is needed by the engine.

2. A fuel pump draws fuel from the tank and delivers it under pressure to the rest of the fuel system.

3. A fuel filter removes impurities and debris from the fuel before it reaches the engine.

4. A fuel injector sprays a precise amount of fuel into the intake manifold or directly into the combustion chamber.

5. A fuel rail distributes pressurized fuel to the fuel injectors.

6. A throttle body regulates the airflow into the engine and, in some cases, mixes the air and fuel before combustion.

7. A fuel pressure regulator controls and maintains the fuel pressure within the system.

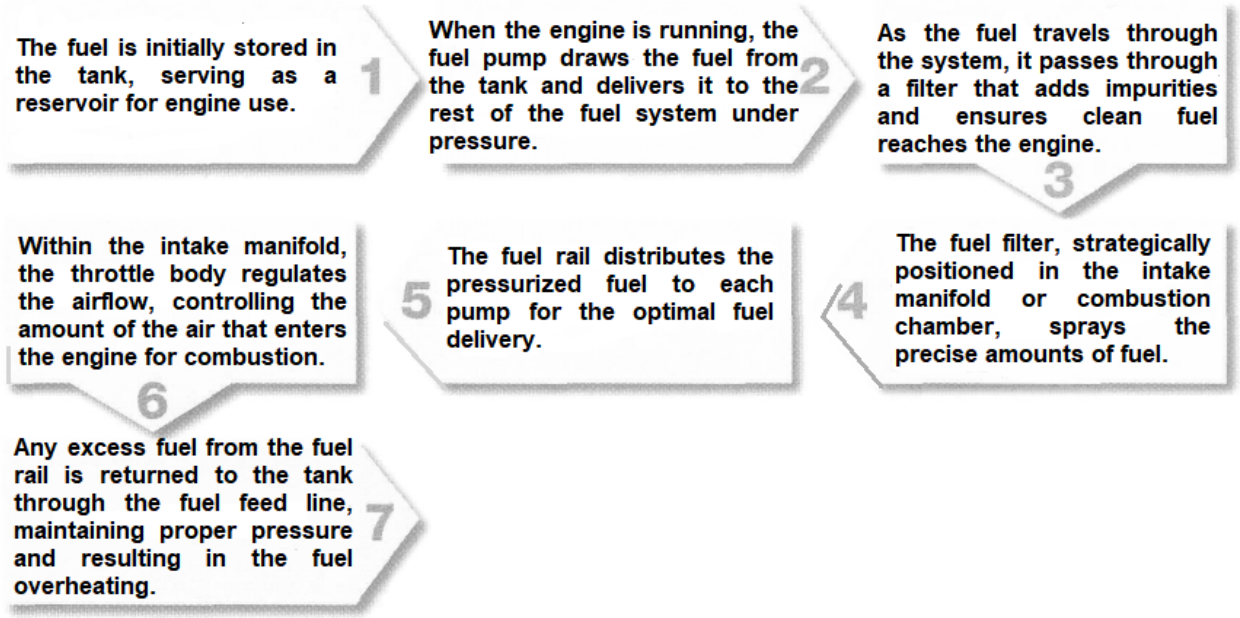
8. A fuel pressure sensor measures the fuel pressure and provides feedback to the engine control unit for precise fuel control.

9. Fuel lines carry the fuel from the tank to the engine and distribute it to the necessary components.

10. A fuel return line returns excess fuel from the fuel rail back to the fuel tank to maintain proper pressure and prevent fuel overheating.

Task 1.5b *Add the verbs from the list (Task 1.5a) to the red segment of your TD. Connect them and the fuel system components, performing the actions these verbs describe.*

Task 1.6 *Study the diagram. Use the information in the text (see Task 1.1) and your TD to identify 5 words that are used incorrectly.*



Task 1.7 *Student A: You are a professional engineer invited to deliver a lecture at a university. Study the fuel system simulation and describe its operation to the students using the simulation.*

TIP! Follow the link to watch the simulation *https://tinyurl.com/2usr4j5m* ***or use the QR-code:***

cerning its operation you would like to know answers to. Listen to the lecture. At the end of the lecture, ask the questions that haven't been answered by the lecturer.

Lesson 2. FUEL SYSTEM MAITENANCE

Task 2.1a *As an automotive engineer, you should be able to develop the guidance for car owners on keeping their fuel system in the best condition.*

Listen to 4 descriptions that will help you develop the guidance. Match them with the pictures (a-d).

TIP! Follow the link to listen to the descriptions *https://tinyurl.com/2p8h3t2s* ***or use the QR-code:***

a) fuel lines	b) a throttle body	c) a fuel injector	d) a fuel filter
			

Speaker:	1.	2.	3.	4.

Task 2.1b *Listen again and restore the phrases that will help you develop the guidance:*

a) VERB + impurities / contaminants / debris;
b) VERB + clogged / worn;
c) VERB + cracks / leaks / damage;
d) VERB + proper fuel flow / smooth and precise airflow control.

Task 2.2 *Develop the guidance explaining to vehicle owners why it's important to maintain the fuel system at regular intervals. Use the information in the chart below, your TD and the following phrases:*

- It's generally best/a good idea to...

- One thing you should/have to do is ...
- The best/most important thing (to do) is to ...
- The main recommendation is/would be…

Maintenance Interval	Number of month or kilometers (miles), whichever comes first								
	Months	6	12	18	24	30	36	42	48
	x1000 km	12	24	36	48	60	72	84	96
	x1000 miles	7.5	15	22.5	30	37.5	45	52.5	60
Fuel system									
Fuel level	check daily								
Fuel filter					R				
Fuel injector					C/I				C/I
Throttle body					C				C
Air filter						R			
Fuel lines and hoses					I				I
Hoses and tubes for emission									I

Chart symbols: I: Inspect; C: Clean; R: Replace.

Lesson 3. SYMPTOMS AND CAUSES OF FUEL SYSTEM COMPONENTS FAULTS

Task 3.1 *A qualified automotive engineer is able to explain the symptoms and causes of fuel system components faults.*

Read the text below and use the information in the text and your TD to restore the phrases that will help you create an infographic for car owners to detect a faulty fuel system components:

a) VERB + a loss of power during acceleration / inconsistent fuel pressure

b) ADJECTIVE + fuel pump motor / seals;

c) have your fuel pump/ the fuel pressure regulator / the fuel tank + VERB+ed;

d) VERB + the fuel filter / the fuel injectors / the fuel pressure regulator / a damaged or leaking fuel tank.

TIP! Follow the link *https://multidict.net/cs/11457* ***to read the text "****COMMON SIGNS OF THE FUEL SYSTEM PROBLEMS****" or use the QR-code:*

COMMON SIGNS OF THE FUEL SYSTEM PROBLEMS

If you notice any of the following issues with your vehicle's fuel system components, it is important to take action to prevent further damage and maintain optimal performance.

Fuel Pump. Your engine may crank but fail to start, you may experience a loss of power during acceleration, or your engine may stall. These symptoms can be caused by a worn-out fuel pump motor, a clogged fuel filter, electrical issues, or fuel contamination. If you experience any of these symptoms, it is recommended to have your fuel pump inspected. Additionally, regularly replace the fuel filter as per the manufacturer's recommendations to ensure proper fuel flow.

Fuel Injector. Look out for a rough idle, poor fuel economy, engine misfires, or hesitation during acceleration. These symptoms can occur due to clogged or dirty fuel injectors, worn-out seals, or electrical issues. To maintain clean injectors, use fuel injector cleaner periodically. If problems persist, consult a mechanic to inspect and clean or replace the fuel injectors if necessary.

Fuel Filter. Watch for engine hesitation, loss of power, decreased fuel efficiency, or engine misfires. These symptoms may indicate a clogged or restricted fuel filter caused by debris, dirt, or sediment. Regularly replace the fuel filter at recommended intervals to ensure proper fuel filtration and prevent fuel flow restrictions.

Fuel Pressure Regulator. Pay attention to fuel leaks, fluctuating fuel pressure, or the engine running too rich or too lean. These issues can arise from a damaged diaphragm, a clogged or faulty fuel return line, or a faulty pressure sensor. If you detect any fuel leaks or experience inconsistent fuel pressure, have the fuel pressure regulator inspected and replaced if necessary. Proper maintenance of the fuel return line is also important.

Fuel Tank. Be alert for fuel odor inside or outside the vehicle, visible fuel leaks, or difficulty refueling. Fuel tank problems can result from corrosion, rust, damaged fuel tank seals, or physical damage. If you notice fuel odors, leaks, or encounter refueling issues, have the fuel tank inspected. Promptly repair or replace a damaged or leaking fuel tank to prevent safety hazards.

Regular maintenance, including following the manufacturer's recommendations, will help prevent fuel system issues and ensure the optimal performance of your vehicle.

Task 3.2 *Follow the link https://tinyurl.com/36fartym to view the "How Mechanics Can Fix Fuel Injection Systems" infographic. Use it as an example to create the infographic to help car owners detect faulty fuel system components. In your infographic use the phrases from Task 3.1 and your TD. Include the information about: 1) each fuel system element function; 2) the symptoms of its malfunction; 3) malfunction results; 4) your recommendations.*

You can use https://app.genial.ly/templates/infographics or any other tool to create your infographic.

Lesson 4. ASSESSMENT OF THE FUEL SYSTEM

Task 4.1 *As an automotive engineer you will assess the fuel system performance and safety.*

Look over the list of the adjectives (from your TD) that can help you describe the fuel system performance. Listen and put them in the table below according to their stress pattern:

TIP! Follow the link to listen to the list of adjectives *https://tinyurl.com/52xc9ye3* ***or use the QR-code:***

Reliable, robust, versatile, precise, efficient, integrated, well-engineered, exceptional, high-performance, durable.

oO	Ooo	oOo	ooOo	oOoo	oooO	Oooo

Task 4.2 *Replace the definitions provided in bold with the appropriate adjectives from task 4.1 or your TD.*

1. The Toyota Camry has a **something that can be trusted or depended upon to perform effectively** fuel system that ensures consistent performance and fuel efficiency.
2. The BMW M5 boasts a **capable of delivering exceptional or superior performance compared to standard or average counterparts** fuel system that delivers exceptional power and precise fuel delivery.
3. The Honda Civic features an **work well without wasting time, money, or energy** fuel system that maximizes fuel economy and reduces emissions.
4. The Ford F-150 is equipped with a **staying in good condition for a long time, even if used a lot** fuel system that can withstand tough conditions and heavy use.
5. The Mercedes-Benz S-Class showcases a **something that has been carefully and skillfully designed** fuel system that provides a seamless and luxurious driving experience.
6. The Volkswagen Golf GTI is praised for its **strong and not likely to have problems** and optimized fuel system, delivering impressive acceleration and responsiveness.
7. The Chevrolet Corvette Stingray utilizes **an unusually good** fuel system that contributes to its high-quality performance and handling.

8. The Subaru Outback is equipped with a **adaptable, flexible, or capable of performing multiple functions or tasks effectively** fuel system, allowing it to handle various terrains and weather conditions with ease.

9. The Audi A4 features an **combining different components** fuel system that works in harmony to deliver a smooth and efficient driving experience.

10. The Porsche 911 Turbo S exhibits a **exact, clear, and correct** fuel system, ensuring precise fuel delivery for exhilarating acceleration and speed.

Task 4.3 *Look over the characteristics of carburetor fuel systems and injection fuel systems below. Compare them using the adjectives from task 4.1 and your TD. Use the following phrases:*

more +adjective / adjective + -er than
_____is as + adjective + as _____
_____is not so / as + adjective + as _____
*Both **A** and **B** have _____*
*Unlike **A**, **B** has_____*
***A** (offers) _____, whereas **B** (offers) _____*
*Compared to **A**, **B** _____*
*As opposed to **A, B** _____*

Carburetor fuel systems	***Injection fuel systems***
Fuel Efficiency	
They generally have low fuel efficiency. Due to their design, carburetors may provide less precise fuel metering and distribution, leading to relatively higher fuel consumption.	They are known for their superior fuel efficiency. Injectors precisely deliver the right amount of fuel directly into the combustion chamber, optimizing fuel consumption and reducing wastage.
Performance	
They may have limitations in terms of performance. They may exhibit slower throttle response and less precise fuel-air mixture control, which can impact overall engine performance and power output.	They offer enhanced performance capabilities and provide precise control over the fuel-air mixture, resulting in improved throttle response, smoother acceleration, and increased power output. Injection systems can adjust fuel delivery based on engine demands, leading to better overall performance.
Emissions	
They typically produce high emissions. The less precise fuel metering and distribution in carburetors can result in less efficient combustion, leading to higher levels of pollutants and greenhouse gas emissions.	They are designed to meet strict emissions regulations. By delivering fuel directly into the combustion chamber, they enable efficient combustion and minimize emissions. Injection systems contribute to lower levels of pollutants and greenhouse gases compared to carburetor systems.
Maintenance	

They are generally simple and easy to maintain. They have fewer components and can be cleaned and adjusted relatively easily. However, periodic maintenance such as cleaning and occasional rebuilds may be necessary to ensure proper performance.	They require periodic maintenance but are generally reliable and have few maintenance needs. Maintenance tasks may include inspection, cleaning, and potential replacement of components such as injectors or sensors. However, modern injection systems are designed to be robust and require less frequent maintenance.
Cost	
They are cost-effective. They involve fewer components and simpler technology, resulting in lower initial installation costs and potentially lower repair and replacement costs.	They are expensive. They involve more sophisticated components such as injectors, sensors, and electronic control units, which can increase the initial installation cost.

Task 4.4 *Work with a partner and prepare a 5-minute presentation about the most fuel-efficient cars you can buy today. Give you presentation to the group.*

TIP! You can follow the link to find some useful information to make your presentation *https://tinyurl.com/5yy9vkmc* ***or use the QR-code:***

Lesson 5. HISTORY OF THE FUEL SUSTEM

Task 5.1 *Look over the list of the breakthrough inventions in the automotive industry. Listen and put them in the order you hear them.*

TIP! Follow the link *https://tinyurl.com/3r4byfpj* ***to listen to the list of the breakthrough inventions or use the QR-code:***

The first practical carburetor, variable valve timing, a rail fuel injection system, a helix-controlled inline pump, the first electronic fuel injection system, the gasoline direct injection technology, a rotary pump, an electronic control unit of injection systems.

Task 5.2 *Use your TD and carry out research on the Internet to help you match the breakthrough inventions in the automotive industry with the year of their development.*

1. the first practical carburetor	a) 1916 (Vickers engines)
2. the common rail fuel injection system	b) 1978 (General Motors engineers)
3. a helix-controlled inline pump	c) 1925 (Jonas Hesselman)
4. gasoline direct injection technology	d) 1986 (Aisin engineers)
5. an electronic control unit	e) 1888 (Karl Benz)
6. variable valve timing (VVT)	f) 1927 (Bosch engineers)

Task 5.3 *Carry out research on the Internet to add some information to the timeline (https://tinyurl.com/m9cytewj). Present your timeline to your groupmates and describe the developments in the automotive industry you have added.*

UNIT 2. TRANSMISSION

Introduction

Introductory Tasks. *Follow the link https://tinyurl.com/enrfmdtn* to complete tasks 1-6 or use the QR-code:

Follow the link https://tinyurl.com/vwyvdb9n to download the Term Dimensions file or use the QR-code:

Lesson 1. TRANSMISSION OPERATION

Task 1.1 *As an automotive engineer, you should know how the transmission system operates. Read the text below and underline the terms that denote the components of the transmission system. Add the missing terms to your TD.*

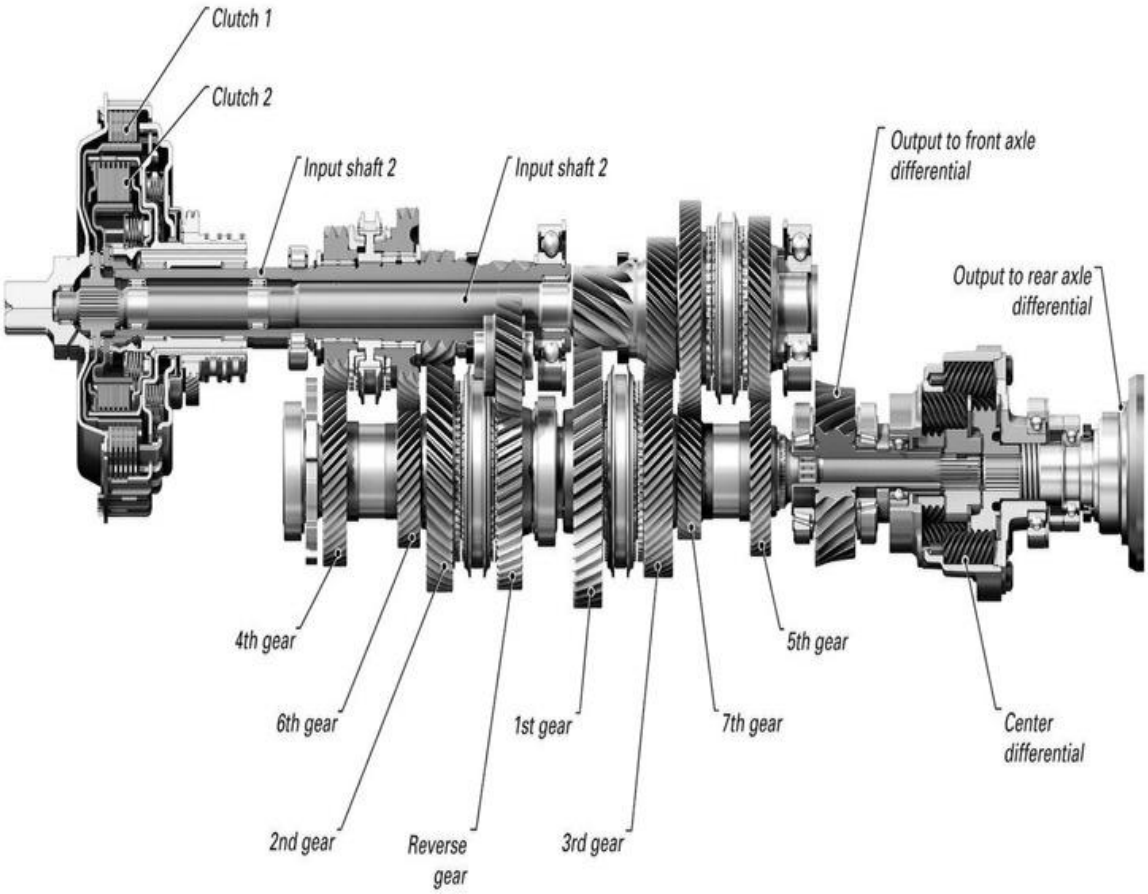
TIP! Follow the link https://multidict.net/cs/11458 to read the "TRANSMISSION OPERATION" text on Clilstore or use the QR-code:

TRANSMISSION OPERATION

Manual transmission. The operation of a manual transmission involves direct driver input and control over gear selection.

When the driver presses the clutch pedal, it disengages the clutch disc from the engine's flywheel. This interrupts the power transfer from the engine to the transmission. With the clutch disengaged, the driver moves the gear lever to select the desired gear ratio.

The gear lever typically has a gate pattern that guides the driver to select the appropriate gear. After selecting the gear, the driver gradually releases the clutch pedal. This allows the clutch disc to engage with the engine's flywheel, transferring power to the transmission.



As the vehicle accelerates, the driver may need to shift to higher gears. To upshift, the driver follows a similar process of pressing the clutch pedal, selecting the new gear, and releasing the clutch pedal while managing throttle input. This allows for smooth gear changes and continuous power transfer.

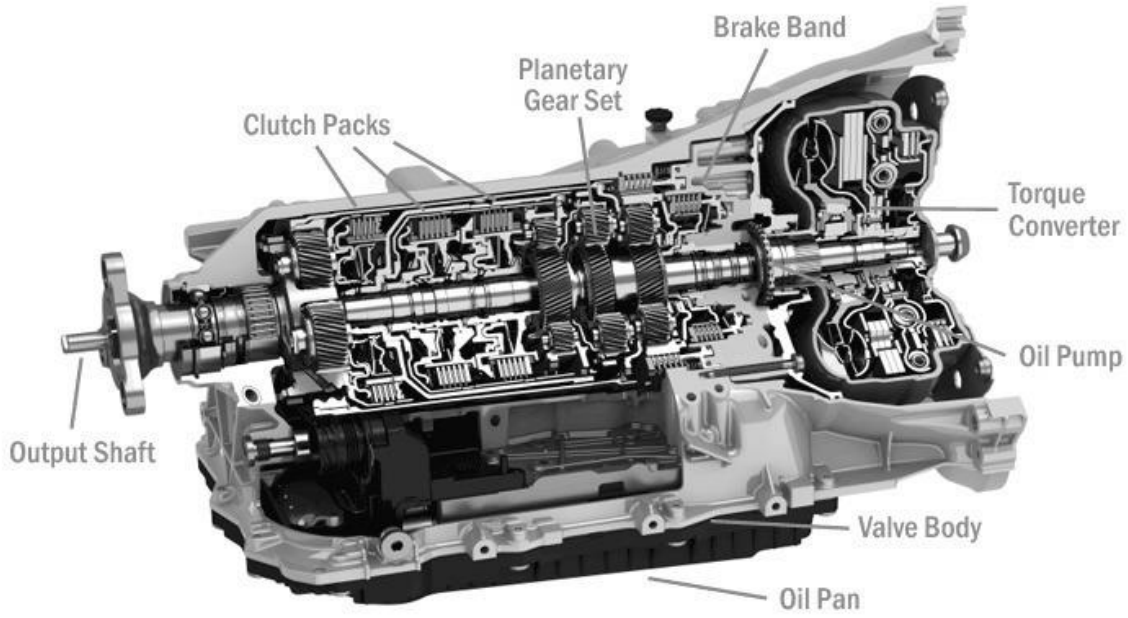
When the driver needs to decelerate, come to a stop, or requires additional power, downshifting to lower gears is necessary. The driver follows the same process of clutch engagement, gear selection, and clutch release to downshift to an appropriate gear. Downshifting provides increased torque and engine braking for better control.

During the operation, the driver needs to synchronize the engine speed (RPM) with the vehicle speed to ensure smooth gear engagement. This synchronization is achieved by manipulating the throttle and clutch pedal while shifting gears.

It's important to note that the driver's skill and experience play a crucial role in the smooth operation of a manual transmission. Proper coordination between clutch pedal usage, gear selection, and throttle control is necessary for efficient gear changes and optimal performance.

Manual transmissions also require lubrication to reduce friction and cooling to prevent overheating. Most manual transmissions have an internal oil pump that splashes and distributes the lubricating fluid to the various components.

Automatic transmission. The transmission operation in an automatic transmission vehicle follows a specific sequence. Let's understand the process.



When the vehicle is stationary, the transmission is set to Park (P). This locks the output shaft and prevents the wheels from turning.

The Neutral (N) position disengages the transmission from the engine. In this state, the engine's power does not transfer to the wheels.

When the driver selects Drive (D), the transmission engages the forward drive gears. Power from the engine is transferred through the torque converter, allowing propulsion to the wheels. The transmission will automatically shift gears based on factors like vehicle speed, throttle position, and load.

Reverse (R) is selected when the driver wants to move the vehicle backward. The transmission engages the reverse gear, and the torque converter transfers power in the opposite direction.

The Transmission Control Unit (TCU) monitors vehicle speed, engine speed, throttle position, and load to determine the optimal gear for performance and fuel efficiency. It engages the appropriate clutches and bands to shift between gear ratios.

When the driver decelerates or requires additional power, the transmission may downshift to a lower gear. This provides increased torque and engine braking for better control. In certain conditions like highway cruising, the torque converter lock-up engages. This creates a direct mechanical connection between the engine and transmission, improving efficiency and reducing power loss.

Throughout the operation, transmission fluid circulates to cool and lubricate the components, ensuring smooth operation and preventing overheating.

The specific details of the transmission operation can vary depending on the vehicle's design and technology.

Task 1.2 *Use the information in the text (see Task 1.1) and your TD to restore the phrases that can help you describe the transmission components:*

a) NOUN + pedal / disk;
b) VERB + to higher / lower gears / between gear ratios;
c) VERB + the clutch disc from the engine's flywheel / the transmission from the engine;
d) VERB + the reverse gear / the forward drive gears / the appropriate clutches;
e) VERB + additional power / lubrication;
f) VERB + increased torque.

Task 1.3a *To explain how the transmission system works, you need to know the terms, which denote the components involved in its operation.*

Look over the list of automotive terms. Circle the terms referring to transmission components.

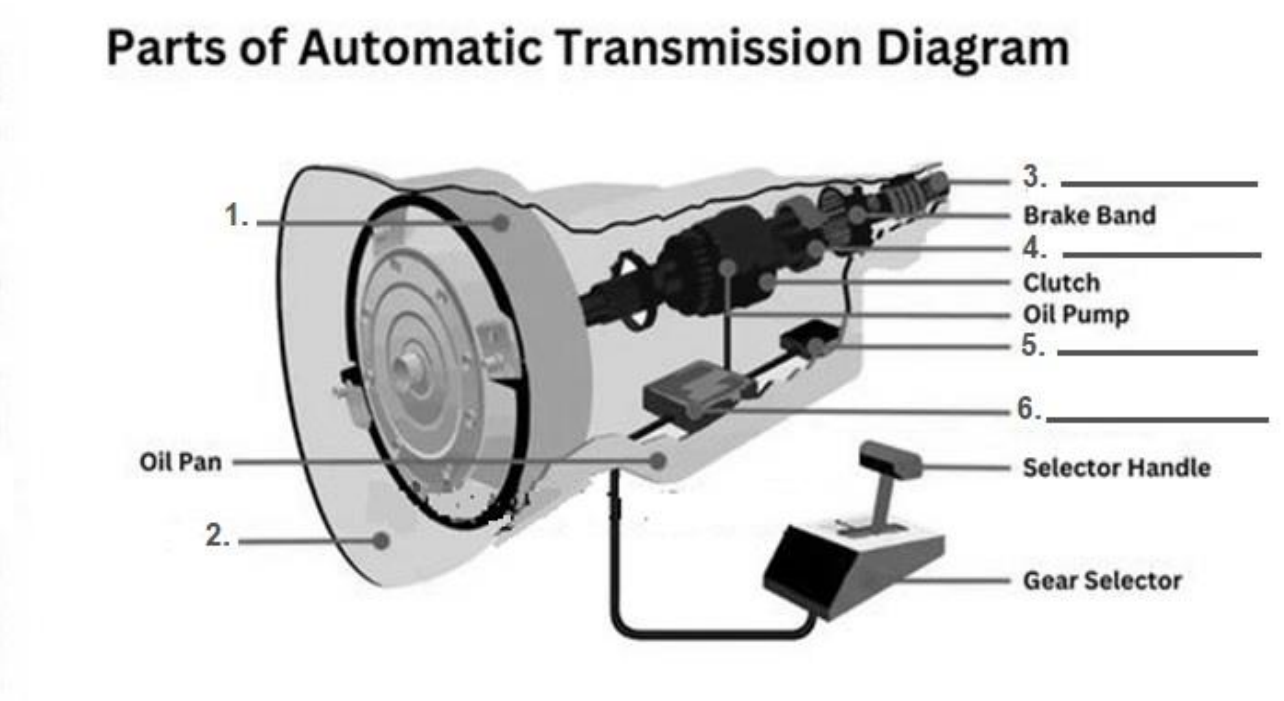
A torque converter, a spark plug, planetary gearsets, clutches, bands, an input shaft, a cylinder block, an output shaft, a camshaft, a transmission control unit, solenoids, a valve body, a crankshaft, a transmission fluid pump, a piston.

Task 1.3b *Put the following terms in the order you hear them:*

TIP! Follow the link to listen to the list of the terms *https://tinyurl.com/52ver5n2* ***or use the QR-code:***

A torque converter, planetary gearsets, clutches, a valve body, a transmission control unit, solenoids, a hydraulic pump, an oil pump, an input shaft, an output shaft, gears, speed sensors, temperature sensors, a transmission fluid cooler, a transmission fluid filter, a modulator valve), a transmission housing.

Task 1.3c *Label the unmarked transmission system parts in the picture using the information in the text (see Task 1.1) and your TD:*



Task 1.4a *Watch a professional review and restore its script by filling in the gaps with the verbs describing the actions of the transmission system parts.*

TIP! Follow the link to watch the review *https://tinyurl.com/2n2p74w7* ***or use the QR-code:***

To get to know the structure of a standard automatic transmission, we're going to take a look at a seven-speed, seven G Tronic with a 722.9 code used in many models of Mercedes Benz.

We can divide the automatic transmission into three main categories: mechatronic, gearbox, and torque converter. The mechatronic is the control center of the transmission. It consists of the transmission control module (TCM), the valve body, and solenoids. Its purpose is to 1**.**_____ the other parts in the gearbox through transmission oil under a certain pressure which is fed at a specific moment during vehicle movement.

In the gearbox, the mechanics go through different modes that characterise a certain gear. It consists of a group shafter, gear wheels, clutch packages, and seals.

In the front is the oil pump, which is firmly connected to the crankshaft of the engine through the housing of the torque converter. When the engine is operating, the pump is constantly 2**.**_____ transmission oil to the mechatronic. The torque converter is a fluid-based clutch between the engine

and the transmission. It has several main functions. It 3**.**_____ motion from the engine to the transmission, it 4**.**_____ the oil pump in the gearbox, 5**.**_____ the torque from the crankshaft to the transmission during the movement of the car. When driving off from a standstill, maximum torque is produced. It 6**.**_____ as a flywheel neutralizing the oscillations and vibrations from the engine to the transmission.

In the lower part of the gearbox, there's a transmission pan and the oil filter. Soft Electronics is one of the few companies in the world which has repair workshops both for mechanics and electronics for certain automatic transmission models.

In the gearbox, transmission oil circulates which has three key functions. It 7**.**_____ the necessary lubrication of the moving parts, helps the cooling of the automatic transmission, and 8**.**_____ in the hydraulic system, which mechanically controls the components in the gearbox. The oil has the following work cycle. From the oil pan, it 9**.**_____ through the filter and from it into the oil pump. The oil pump then 10**.**_____ it into the valve body of the mechatronic at high pressure. The mechatronic 11**.**_____ the pressure and distributes it to the torque converter and the various sections of the gearbox. After that, the oil goes through the cooling system and 12**.**_____ the transmission pan for the next cycle.

Task 1.4b *Add the verbs you inserted (Task 1.4a) to your TD. Connect them and the transmission system components (from the blue segment of your TD) performing the actions these verbs describe.*

Task 1.5a *Replace the underlined verbs, which denote the actions of the transmission system components, with their synonyms using the following list of words (in some sentences two variants are possible):*

determine	move	apply	transfer	enable
allow	connect	receive	house	transmit

1. The clutch disc links the engine to the transmission and establishes/disengages power flow from the engine to the transmission.
2. The clutch pressure plate exerts pressure on the clutch disc, enabling it to connect with the flywheel and transfer power.
3. The clutch release bearing facilitates the smooth engagement and disengagement of the clutch by exerting force on the clutch pressure plate. The gears convey power from the input shaft to the output shaft while permitting different gear ratios. They ascertain the speed and torque delivered to the wheels.
4. The synchronizers facilitate seamless shifting between gears by aligning the speeds of the input and output shafts before engagement, reducing gear clash and wear.

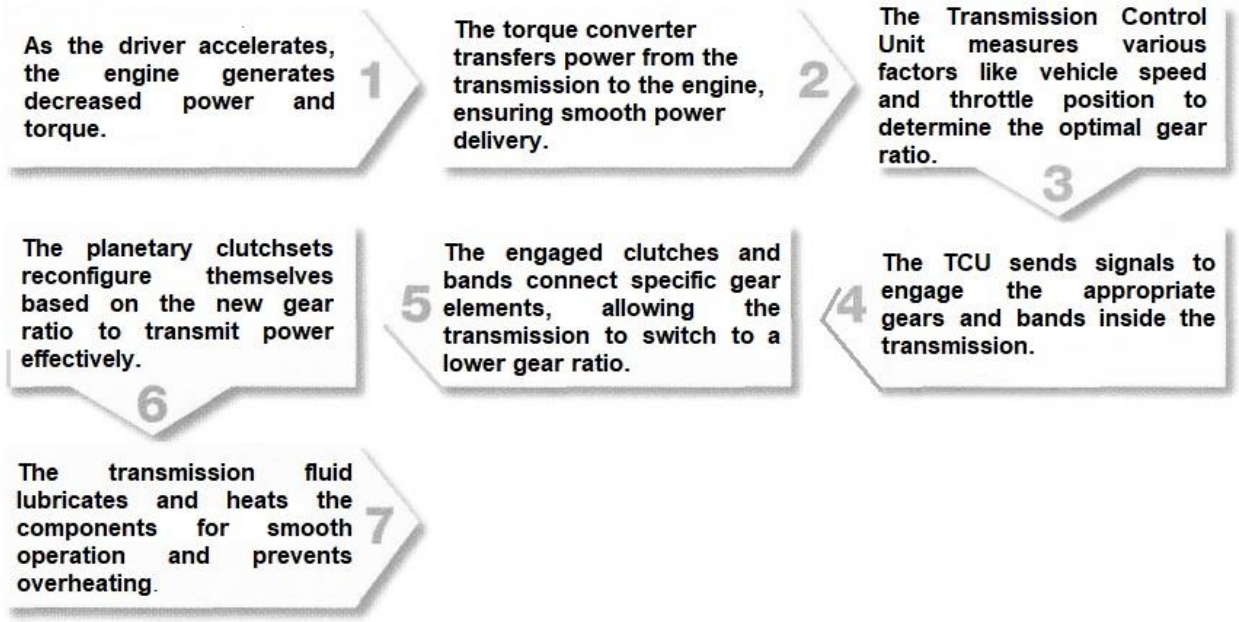
5. The shift forks reposition the synchronizers and gears to attain the desired positions for engaging the selected gear.

6. The input shaft accepts power from the engine through the clutch and transmits it to the gears for various gear ratios.

7. The transmission housing encloses all the internal components of the transmission, providing structural support and safeguarding the gears and other parts from external elements.

Task 1.5b *Add the verbs from the list (Task 1.5a) to the red segment of your TD. Connect them and the transmission system components, performing the actions these verbs describe.*

Task 1.6 *Study the diagram. Use the information in the text (see task 1, page 2) and your TD to identify 8 words that are used incorrectly.*



Task 1.7 *Student A: You are a professional engineer invited to deliver a lecture at a university. Study the transmission simulation and describe its operation to the students using the simulation.*

TIP! Follow the link *https://tinyurl.com/474f3uze* ***to watch the simulation or use the QR-code:***

Student B: You are a student. You are going to listen to the lecture on the transmission system delivered by a professional engineer. Prepare 10 questions concerning its operation you would like to know the answers to. Listen to

the lecture. At the end of the lecture, ask the questions that haven't been answered by the lecturer.

Lesson 2. TRANSMISSIION MAITENANCE

Task 2.1a *As an automotive engineer, you should be able to provide car owners with the guidance on keeping their transmission system in the best condition.*

Listen to 4 descriptions that will help you explain why transmission system parts need to be regularly inspected. Match them with the pictures (a-d).

TIP! Follow the link to listen to the descriptions *https://tinyurl.com/48dpykdp* ***or use the QR-code:***

a) a transmission filter	b) a transmission gasket	c) transmission fluid	d) an ignition coil
			

Speaker:	1.	2.	3.	4.

Task 2.1b *Listen again and restore the phrases that will help you develop the guidance:*

a) VERB + proper lubrication and cooling properties;
b) VERB + a clean and unobstructed fluid flow;
c) VERB + in decreased fluid flow, poor lubrication;
d) VERB + low fluid levels / inadequate lubrication / potential damage;
e) VERB + the temperature of the transmission fluid;
f) VERB + potential damage.

Task 2.1c *As an automotive engineer, you should be able to develop the guidance for car owners on keeping their ignition system in the best condition.*

Develop the guidance. Use the information in the chart, your TD and the following phrases:

- It's generally best/a good idea to...
- One thing you should/have to do is ...
- The best/most important thing (to do) is to ...
- The main recommendation is/would be…

Maintenance Interval	Number of month or kilometers (miles), whichever comes first								
	Months	6	12	18	24	30	36	42	48
	*1000 km	12	24	36	48	60	72	84	96
	*1000 miles	7.5	15	22.5	30	37.5	45	52.5	60
TRANSMISSION									
Transmission fluid					R				R
Transmission filter					R				R
Transmission pan gasket					I/R				I/R
Transmission mounts									I/R
Clutch system (for manual transmissions)									I/A

Chart symbols: I: Inspect; R: Replace; A: Adjust.

Lesson 3. SYMPTOMS AND CAUSES OF TRANSMISSION COMPONENTS FAULTS

Task 3.1 *A qualified automotive engineer is able to explain the symptoms and causes of the transmission system faults.*

Read the text below and use the information in the text and your TD to restore the phrases that will help you create an infographic for car owners to detect faulty transmission system components:

a) VERB + gears slipping;

b) VERB + indicate worn-out clutch plates / worn-out bearings / damaged gears / overheated transmission fluid / a fault within the transmission system;

c) a + ADJECTIVE + valve body / transmission control module / torque converter;

d) VERB to + this symptom / to the noisy operation;

e) ADJECTIVE + clutch plates / clutch discs / bearings / seals.

SYMPTOMS AND CAUSES OF TRANSMISSION COMPONENTS FAULTS

Transmission components can fail over time due to various reasons, leading to noticeable symptoms and potential issues with your vehicle's transmission system. It's important to be aware of these symptoms and address them promptly to prevent further damage. Here are some common symptoms of transmission component failure and their possible causes.

If you experience gears slipping or the vehicle spontaneously shifting into neutral, it could indicate worn-out clutch plates, a malfunctioning torque converter, or low transmission fluid levels. Other possible causes include damaged bands or shift solenoids.

When you shift gears, if there is a noticeable delay before the transmission engages or the vehicle moves, it may be due to a faulty valve body, worn-out clutch discs, or inadequate fluid pressure. Low transmission fluid level or a clogged filter can also contribute to this symptom.

If the transmission shifts unpredictably or abruptly between gears without driver input, it could be caused by a malfunctioning shift solenoid, damaged wiring, or a faulty transmission control module (TCM).

Unusual noises coming from the transmission, such as grinding, whining, or clunking sounds, can indicate worn-out bearings, damaged gears, or a faulty torque converter. Insufficient transmission fluid or improper fluid viscosity can also contribute to the noisy operation.

The presence of transmission fluid puddles or spots underneath the vehicle is a sign of a possible leak. Leaks can occur due to worn-out seals, damaged gaskets, or loose connections. Neglecting to address leaks can lead to low fluid levels, inadequate lubrication, and potential transmission damage.

A burning odour, especially when accompanied by slipping gears or overheating, may indicate overheated transmission fluid. This can be caused by a malfunctioning cooler, low fluid levels, or excessive friction due to worn-out clutch plates or bands.

Illumination of the "Check Engine" light or a specific transmission-related warning light on the instrument panel may indicate a fault within the transmission system. Causes can range from sensor malfunctions to electrical issues or internal component failures.

It's important to note that these symptoms can vary depending on the type of transmission (automatic or manual) and the specific component affected.

Task 3.2 *Follow the link https://tinyurl.com/mttda8 to view the "Common Reasons for Transmission Failure" infographic. Use it as an example to create the infographic to help car owners detect faulty transmission components. In your infographic use the phrases from Task 3.1 and your TD. Include the information about: 1) each transmission element function; 2) the symptoms of its malfunction; 3) malfunction results; 4) your recommendations.*

You can use https://app.genial.ly/templates/infographics or any other tool to create your infographic.

Lesson 4. ASSESSMENT OF THE TRANSMISSION SYSTEM

Task 4.1 *As an automotive engineer you will assess the transmission system performance and safety.*

Look over the list of adjectives (from your TD) that can help you describe its performance. Listen and put them in the table below according to their stress pattern:

TIP! Follow the link https://tinyurl.com/mrx369w6 to listen to the list of the adjectives or use the QR-code:

Adaptive, complex, durable, efficient, innovative, integrated, reliable, responsive, sophisticated, versatile.

Oo	Ooo	oOo	Oooo	oOoo	oOooo

Task 4.2 *Replace the definitions provided in bold with the appropriate adjectives from Task 4.1 or your TD.*

1. The transmission system of the Toyota Prius is known for its **work well without wasting time, money, or energy** operation, allowing for optimal fuel economy in both city and highway driving conditions.
2. The BMW M5 is equipped with a **can be trusted or depended on** transmission system that delivers precise and lightning-fast gear shifts, enhancing the overall performance and driving experience.
3. The Mercedes-Benz S-Class features a **staying in good condition for a long time** transmission system that is designed to withstand high torque outputs, ensuring a smooth and reliable power delivery.
4. The transmission system of the Porsche 911 is known for its smooth shifting and **reacting quickly** nature, allowing drivers to enjoy a dynamic and engaging driving experience.
5. The Chevrolet Corvette Z06 comes with an **combines many different parts in a way that works well** transmission system that works seamlessly with the vehicle's performance features, delivering power and handling that matches its high-performance capabilities.
6. The Honda Civic Type R boasts a **very well designed and very advanced, and often works in a complicated way** transmission system that

optimizes gear ratios and shift timing, resulting in a thrilling and precise driving experience.

7. The Jeep Wrangler's transmission system is essential for its off-road capabilities, offering a **consisting of many different parts and often difficult to understand** system with low-range gearing for superior traction and control on challenging terrains.

8. The Audi RS7 features an **having an ability to change to suit changing conditions** transmission system that can adjust its shifting patterns based on driving conditions and driver preferences, providing a personalized and dynamic driving experience.

9. The Tesla Model S showcases an **new, different, and better than those that existed before** transmission system that is completely electric, offering instant torque delivery and a high-performing acceleration without the need for traditional gears.

10. The Volkswagen Golf GTI features a **having many different uses** transmission system that offers different driving modes, allowing drivers to switch between comfort and sport settings for an exhilarating and adaptable performance.

Task 4.3 *Look over the chart below and compare the characteristics of three types of transmissions: traditional automatic, dual-clutch, and continuously variable. Use the following phrases and the adjectives from Task 4.1 or your TD:*

more +adjective / adjective + -er than
_____is as + adjective + as _____
_____is not so / as + adjective + as _____
*Both **A** and **B** have _____*
*Unlike **A**, **B** has_____*
***A** (offers) _____, whereas **B** (offers) _____*
*Compared to **A**, **B** _____*
*As opposed to **A, B** _____*

Traditional Automatic Transmissions	Dual-clutch Transmissions	Continuously Variable Transmissions
Efficiency		
They can have low efficiency due to energy losses in torque converters and hydraulic systems.	They are generally efficient due to their direct mechanical power transfer and quick shifting capabilities.	They can provide high efficiency by allowing the engine to operate at its optimal RPM range for improved fuel economy.
Shift Speed and Smoothness		
They offer smooth gear shifts, but the shift speed may be slow.	They offer both shift speed and smoothness, providing lightning-fast gear changes without interrupting power delivery.	They offer seamless gear transitions without traditional shifting, resulting in a smooth driving experience.
Complexity		
They can be complex due to their mechanical and hydraulic components, requiring regular maintenance and potential repairs.	They are mechanically complex with multiple clutches and intricate control systems, potentially requiring specialized maintenance and repair.	They are mechanically simple, resulting in reduced complexity and potentially low maintenance costs.
Cost		
They are commonly found in various vehicles, making them relatively cost-effective to produce and maintain.	They are often found in higher-end vehicles, making them more expensive to manufacture and potentially costlier to maintain or repair.	They are widely used in many vehicles and can offer a cost-effective transmission option
Performance		
They provide smooth and comfortable driving experiences suitable for a wide range of driving conditions.	They offer quick and precise gear changes, enhancing performance and responsiveness, especially in high-performance vehicles.	They can prioritize fuel efficiency over sporty performance, but they provide smooth acceleration and a consistent power delivery.

Task 4.4 *Work with a partner and prepare a 5-minute presentation about different types of transmission systems. Give your presentation to the group.*

TIP! You can follow the link https://tinyurl.com/znbxtxeh to find some useful information to make your presentation or use the QR-code:

Lesson 5. HISTORY OF THE TRANSMISSION SYSTEM

Task 5.1 *Look over the list of the breakthrough inventions in the automotive industry. Listen and put them in the order you hear them.*

TIP! Follow the link https://tinyurl.com/2p8sjzxd to listen to the list of the breakthrough inventions or use the QR-code:

The first manual transmission, a manual transmission with a drive shaft and a differential axle for the rear wheels, a synchronized manual transmission, the first semi-automatic transmission, a five-speed clutchless gearbox, the first three-speed automatic transmission, the first standard-equipment column shifter, an overdrive transmission, a continuously variable transmission, a dual clutch transmission, a semi-automatic transmission.

Task 5.2 *Use your TD and carry out research on the Internet to help you match the breakthrough inventions with their developers.*

1. the first manual transmission	a) Louis Renault
2. the manual transmission with a drive shaft and a differential axle for the rear wheels	b) Emile Levassor and Louis-Rene Panhard
3. a synchronized manual transmission	c) General Motors engineers
4. the first semi-automatic transmission	d) General Motors engineers
5. a five-speed clutchless gearbox	e) Studebaker and Ford
6. the first three-speed automatic transmission	f) Cadillac engineers

Task 5.3 *Carry out research on the Internet to add some information to the timeline (https://tinyurl.com/enrfmdtn). Present your timeline to your groupmates and describe the developments in the automotive industry you have added.*

UNIT 3 COOLING SYSTEM

Introduction

Introductory tasks. *Follow the link https://tinyurl.com/3jvtsz5v to complete tasks 1-6 or use the QR-code:*

Follow the link https://tinyurl.com/vwyvdb9n to download the Term Dimensions file or use the QR-code:

Lesson 1. COOLING SYSTEM OPERATION

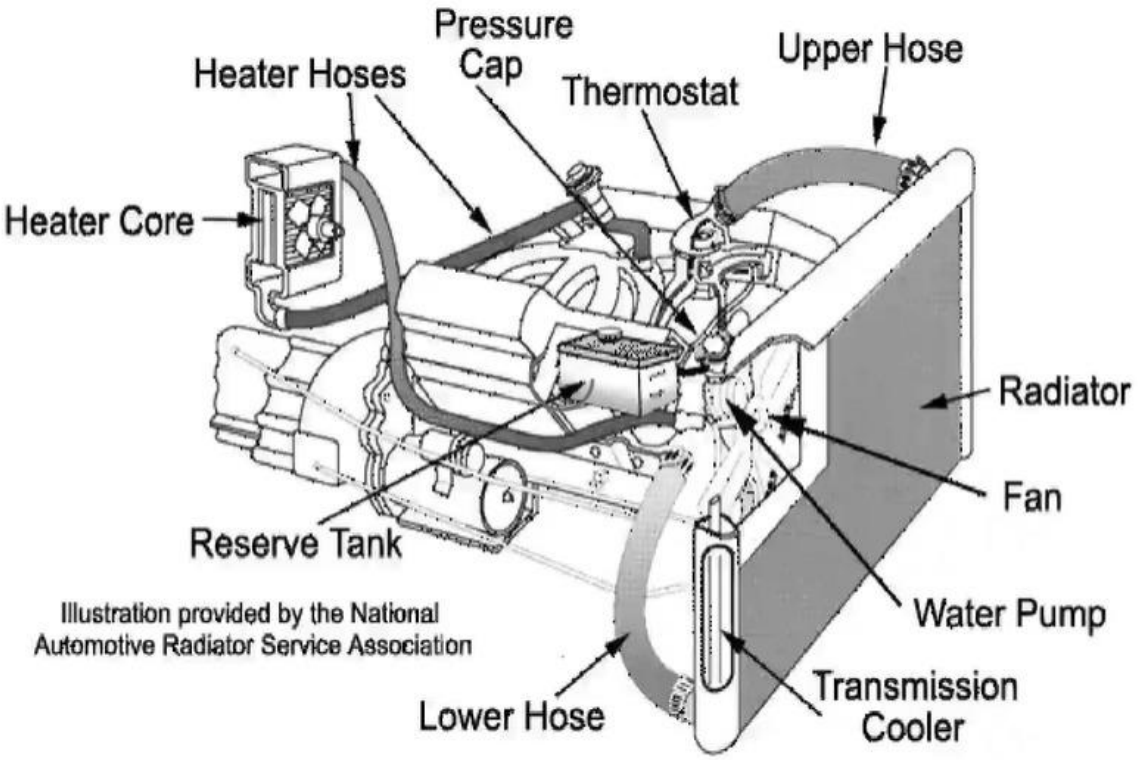
Task 1.1 *As an automotive engineer, you should know how the cooling system operates. Read the text below and underline the terms that denote components of the cooling system. Add the missing terms to your TD.*

TIP! Follow the link *https://multidict.net/cs/11459* ***to read the "COOLING SYSTEM OPERATION" text on Clilstore or use the QR-code:***

COOLING SYSTEM OPERATION

As the engine starts running, it generates heat due to the combustion process. The temperature of the coolant rises and the water pump, driven by a belt connected to the engine, begins circulating the coolant from the engine through the cooling system. The coolant flows from the engine to the radiator through hoses or pipes. It enters the radiator through the upper radiator hose.

As the coolant enters the radiator, it passes through a series of tubes and fins. The radiator's core and the air flowing through it help dissipate the heat from the coolant. The cooling fan, either mechanically driven by the engine or electrically powered, turns on to increase the airflow through the radiator. This helps cool the coolant further, especially when the vehicle is stationary or moving at low speeds.



The thermostat, located between the engine and the radiator, monitors the temperature of the coolant. If the temperature is within the optimal range, the thermostat remains closed, and the coolant continues to circulate through the engine and the radiator. If the temperature exceeds the optimal range, the thermostat opens, allowing the coolant to flow directly to the radiator bypassing the engine. This helps remove heat from the coolant more efficiently.

As the coolant flows through the radiator, it releases heat to the surrounding air and cools down. The cooled-down coolant then exits the radiator through the lower radiator hose, returns to the engine through the lower radiator hose, and continues the cycle of absorbing heat from the engine.

Some of the coolant is diverted to the heater core, a small radiator-like component located in the passenger compartment. The heater core uses the hot coolant to provide heat for the vehicle's heating system, allowing warm air to be blown into the cabin when needed.

Excess pressure in the cooling system is regulated by the radiator cap. If the pressure exceeds a certain threshold, the radiator cap allows the coolant to flow into the expansion tank or reservoir. On the other hand, when the engine cools down, the vacuum created by the contracting coolant draws the coolant back from the expansion tank into the system.

This sequence repeats as long as the engine is running, ensuring that the coolant circulates through the engine, radiator, and other components, effectively dissipating the heat generated by the engine and maintaining an optimal operating temperature.

Task 1.2 *Use the information in the text (see Task 1.1) and your TD to restore the phrases that can help you describe the cooling system components:*

a) the + NOUN + flows / enters the radiator / circulates is diverted to the heater core;

b) the upper / lower radiator + NOUN;

c) VERB+ the optimal range / a certain threshold;

d) generate / dissipate / remove / release / provide / absorb + NOUN.

Task 1.3a *To explain how the cooling system works, you need to know the terms, which denote the components involved in its operation.*

Look over the list of automotive terms. Circle the terms referring to cooling system components.

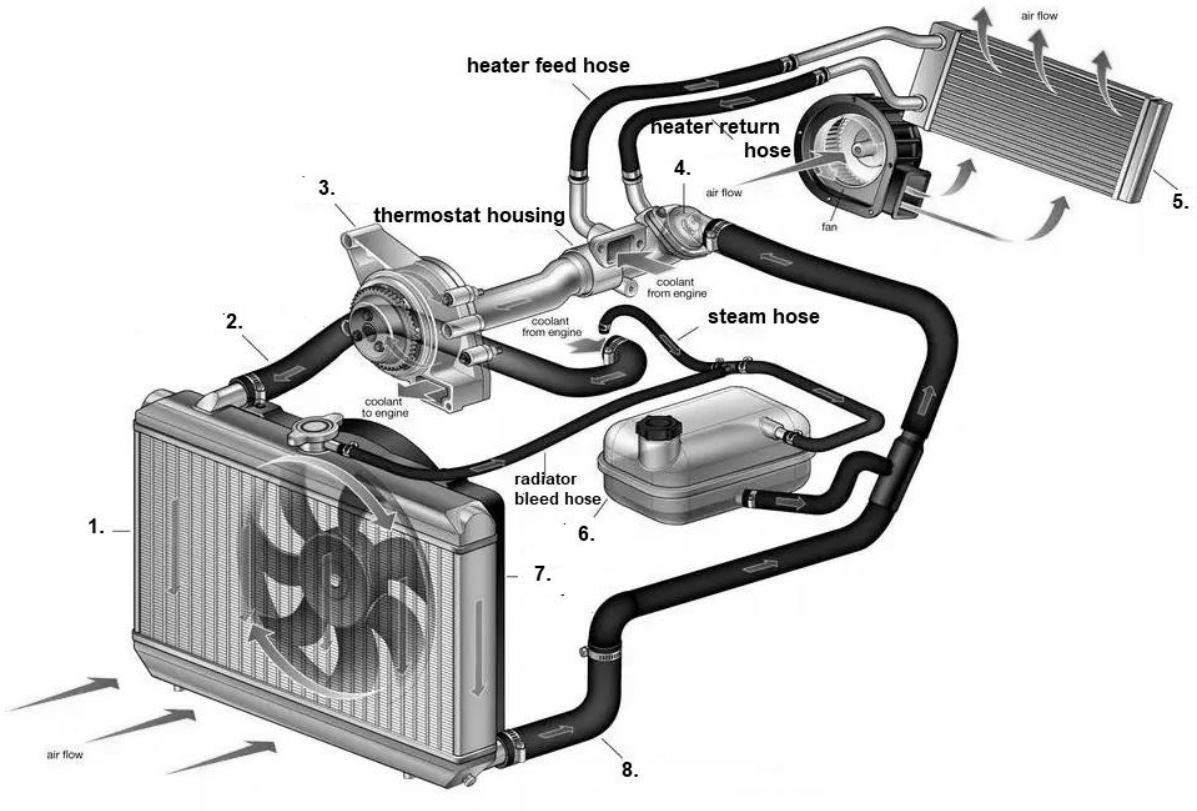
A radiator, a water pump, a master cylinder, a coil, a thermostat, a cooling fan, a heater core, a piston, a distributor cap, an expansion tank, hoses, pipes, a radiator cap, a rotor arm.

Task 1.3b *Put the following terms in the order you hear them:*

TIP! Follow the link to listen to the list of the terms *https://tinyurl.com/tz5tvj7j* ***or use the QR-code:***

A radiator, a water pump, a thermostat, a cooling fan, a heater core, an expansion tank, a heater feed hose, a heater return hose, an upper radiator hose, a lower radiator hose, pipes, a radiator cap, coolant.

Task 1.3c *Label the unmarked cooling system parts in the picture using the information in the text (see Task 1.1) and your TD:*



Task 1.4a *Watch a professional review and restore its script by filling in the gaps with the verbs (in the active or passive voice) describing the actions of the cooling system parts.*

TIP! Follow the link to watch the review *https://tinyurl.com/3ztrknp4* ***or use the QR-code:***

The thermostat is actually a valve which 1._____ the flow of the coolant. It will always be covered in the coolant so that the temperature can be sensed. Let's start the operation from a cold engine. When the engine is cold, the bypass valve stays open so the coolant 2._____ the radiator and 3._____ through the engine. This helps the engine to heat up to operating temperature quickly. Eventually, the coolant temperature 4._____ by absorbing the heat from the engine. Once the coolant starts to reach a higher temperature, which is usually between 160 to 190 Fahrenheit, the bypass valve will start to 5._____ and the main valve will start to **open**. This allows the cold coolant from the radiator to 6._____ to the engine side, and the hot coolant from the engine side to flow to the radiator. In most cars, the coolant temperature sensor is 7._____ near the thermostat housing. It will 8._____ the radiator fan if the coolant on the

radiator side is at a high temperature. Now the hot coolant in the radiator will 9._____ its heat to the atmosphere with the help of the fan. At the same time, the cold coolant received from the radiator will start to 10._____ the heat from the engine for the next cycle.

Task 1.4b *Add the verbs you inserted (Task 1.4a) to your TD. Connect them and the cooling system components (from the blue segment of your TD) performing the actions these verbs describe.*

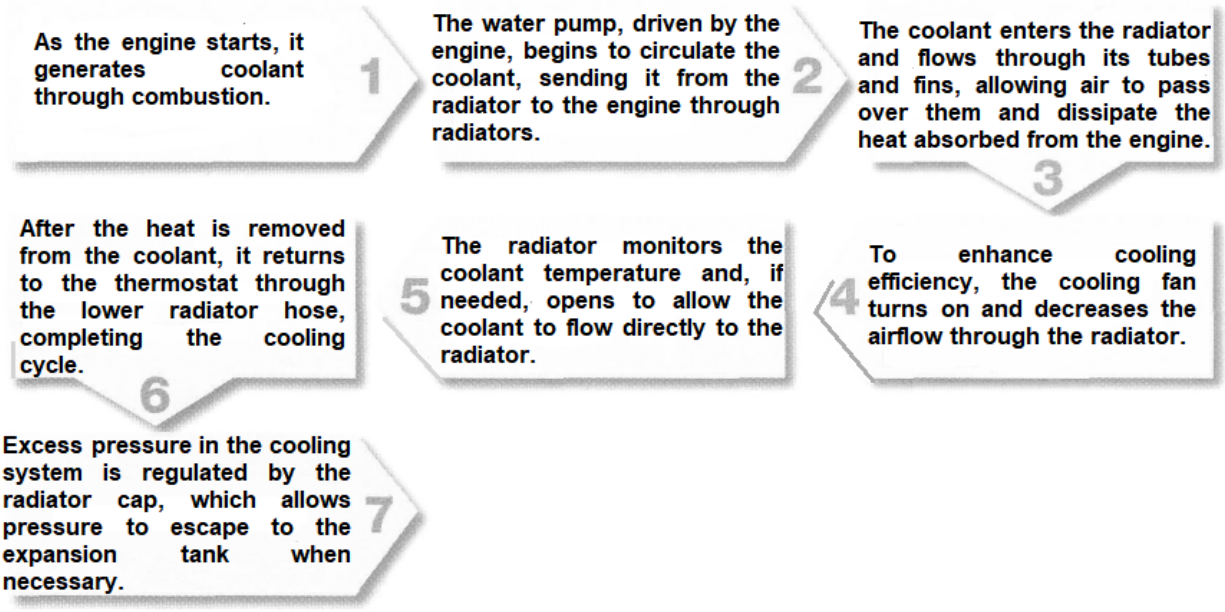
Task 1.5a *Replace the underlined verbs, which denote the actions of the cooling system parts, with their synonyms using the following list of words (sometimes two variants are possible):*

regulate	dissipate	provide	connect
maintain	allow	increase	circulate

1. The radiator expels heat from the coolant by allowing air to flow through its tubes and fins, helping to lower the temperature of the coolant.
2. The water pump guarantees a continuous flow of coolant to absorb heat from the engine and transfer it to the radiator.
3. The thermostat adjusts the flow of coolant based on the engine's temperature.
4. The cooling fan enhances the airflow through the radiator to help remove the heat of the coolant when the vehicle is stationary or moving at low speeds.
5. The heater core supplies heat for the vehicle's heating system, allowing warm air to be blown into the passenger compartment.
6. The expansion tank keeps the proper coolant level in the system.
7. Hoses and pipes link the different components of the cooling system.
8. The radiator cap enables excess pressure to escape to the expansion tank.

Task 1.5b *Add the verbs from the list (Task 1.5a) to the red segment of your TD. Connect them and the cooling system components, performing the actions these verbs describe.*

Task 1.6 *Study the diagram. Use the information in the text (see Task 1.1) and your TD to identify 8 words that are used incorrectly.*



Task 1.7 *Student A: You are a professional engineer invited to deliver a lecture at a university. Study the cooling system simulation and describe its operation to the students using the simulation.*

TIP! Follow the link to watch the simulation *https://tinyurl.com/mt3r9fej* ***or use the QR-code:***

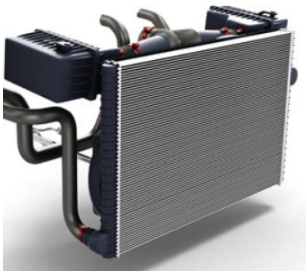
Student B: You are a student. You are going to listen to the lecture on the cooling system delivered by a professional engineer. Prepare 10 questions concerning its operation you would like to know the answers to. Listen to the lecture. At the end of the lecture, ask the questions that haven't been answered by the lecturer.

Lesson 2. COOLING SYSTEM MAITENANCE

Task 2.1a *As an automotive engineer, you should be able to provide car owners with the guidance on keeping their cooling system in the best condition.*

Listen to 4 descriptions that will help you explain why cooling system parts need to be regularly inspected. Match them with the pictures (a-d).

TIP! Follow the link to listen to the descriptions *https://tinyurl.com/46r4ba4p* ***or use the QR-code:***

a) coolant	b) a radiator	c) a water pump	d) hoses and pipes
			

Speaker:	1.	2.	3.	4.

Task 2.1b *Listen again and restore the phrases that will help you develop the guidance:*

a) VERB + the flow of coolant / air to flow through;
b) VERB + for signs of wear, cracking, or leaks;
c) absorb / dissipate heat;
d) VERB + free of debris, bugs, or other obstructions;
e) VERB + a constant flow of coolant / optimal cooling efficiency;
f) VERB + debris.

Task 2.1c *Use the information from the chart below, tasks 2.1a and 2.1b, and your TD to create the guidance giving essential tips on keeping the cooling system in the best condition. Explain: 1) what cooling system parts should be checked; 2) how often they should be checked and 3) why it's a good idea to check them. Use the following phrases:*

- It's generally best/a good idea to...
- One thing you should/have to do is ...
- The best/most important thing (to do) is to ...
- The best course of action is to …

Maintenance Interval	Number of month or kilometers (miles), whichever comes first								
	Months	6	12	18	24	30	36	42	48
	x1000 km	12	24	36	48	60	72	84	96
	x1000 miles	7.5	15	22.5	30	37.5	45	52.5	60
COOLING SYSTEM									
Engine coolant	FL22 type	Replace at first 192,000 km (120,000 miles) or 10 years; after that, every 96,000 km (60,000 miles) or 5 years							
	Others	Replace at first 96,000 km (60,000 miles) or 4 years; after that, every 2 years							
Radiator		Clean once a year							
Water pump									I
Hoses and belts					I				I

Chart symbols:

I: Inspect

Lesson 3. SYMPTOMS AND CAUSES OF COOLING COMPONENTS FAULTS

Task 3.1 *A qualified automotive engineer is able to explain the symptoms and causes of cooling system faults.*

Read the text below and use the information in the text and your TD to restore the phrases that will help you create an infographic for car owners to detect defective cooling system components:

a) VERB + problems with a radiator, a water pump, a thermostat, or a cooling fan;
b) VERB + in a loss of coolant / squeaking or rattling noises;
c) ADJECTIVE + hoses;
d) a + ADJECTIVE + water pump gasket;
e) a + ADJECTIVE + thermostat / cooling fan;
f) a + ADJECTIVE + cracked radiator;
g) VERB + to inadequate cooling;
h) proper / regular + NOUN.

MALFUNCTIONING COOLING SYSTEM COMPONENTS: SYMPTOMS AND CAUSES

If your engine consistently overheats or frequently reaches high temperatures, it can be a sign of a malfunctioning cooling system component. This may indicate problems with a radiator, a water pump, a thermostat, or a cooling fan.

If you frequently need to add coolant to maintain the proper level, it could be a sign of a coolant leak or an issue with the expansion tank. Any visible coolant leaks under the vehicle, around the radiator, hoses, or water pump can indicate a problem. The causes of coolant leaks can vary, including damaged hoses, a worn-out water pump gasket, or a cracked radiator. These leaks can result in a loss of coolant, leading to insufficient cooling and potential engine damage.

If the coolant appears rusty, oily or has a milky appearance, it could be a sign of coolant contamination, such as oil mixing with the coolant or a blown head gasket.

A malfunctioning thermostat can fail to open or close at the appropriate temperature, disrupting the flow of coolant. If the thermostat remains closed, it can restrict coolant circulation, leading to inadequate cooling and eventual engine overheating.

A failing water pump may produce grinding or whining sounds due to worn bearings, while a malfunctioning cooling fan can result in squeaking or rattling noises. These noises indicate mechanical issues within the components, which can hinder their proper functioning and compromise the cooling system's performance.

These symptoms can arise due to various causes, including normal wear and tear, age-related deterioration, lack of proper maintenance, or external factors like debris or road damage. Regular maintenance, including coolant flushes, inspections, and component replacements as recommended by the vehicle manufacturer, can help prevent cooling system component failure and ensure an efficient cooling system's performance.

Task 3.2 *Follow the link https://tinyurl.com/5n9aarzj to view the "Signs of a Defective Coolant Temperature Sensor in a Car" infographic. Use it as an example to create an infographic to help car owners detect defective cooling system components. In your infographic use the phrases from Task 3.1 and your TD. Include the information about: 1) each cooling system element function; 2) the symptoms of its malfunction; 3) malfunction results; 4) your recommendations.*

You can use https://app.genial.ly/templates/infographics or any other tool to create your infographic.

Lesson 4. ASSESSMENT OF THE COOLING SYSTEM

Task 4.1 *As an automotive engineer, you will assess the cooling system performance and safety.*

Look over the list of adjectives (from your TD) that can help you describe its performance. Listen and put them in the table below according to their stress pattern:

TIP! Follow the link** https://tinyurl.com/5duwwzp8 **to listen to the list of the adjectives or use the QR-code:

Advanced, dependable, efficient, innovative, optimal, optimized, reliable, resilient, robust.

oO	Ooo	oOo	oOoo	Oooo

Task 4.2 *Replace the definitions provided in bold with the appropriate adjectives from Task 4.1 or your TD.*

1. The highly **work well without wasting time, money, or energy** cooling system of the Porsche 911 GT3 ensures optimal engine performance even under demanding track conditions, keeping the flat-six powerplant running cool and delivering unrivaled performance.
2. With its **very modern** cooling technology, the BMW M5 boasts a robust and well-designed cooling system that effectively dissipates heat from the high-performance engine, enabling drivers to unleash the car's full potential on the open road.
3. The Lexus LC 500h features a **able to be trusted to do what you need or expect** and well-maintained cooling system, ensuring efficient thermal management for its hybrid powertrain. With precision-engineered components, this luxury coupe maintains optimum performance while prioritizing fuel efficiency.
4. The Aston Martin DBS Superleggera features an **new, different, and better than those that existed before** and efficient cooling system, harnessing cutting-edge technology to ensure optimal thermal management. Its high-performance cooling system guarantees consistent power delivery, making every drive an exhilarating experience.
5. The Volkswagen Golf GTI boasts a **can be trusted or depended on** and effective cooling system that perfectly complements its sporty nature. With precise temperature control and a well-engineered radiator, this hot

hatch stays cool even during spirited driving, ensuring a thrilling ride from start to finish.

6. The Tesla Model S showcases an advanced and **the best or most suitable** cooling system, tailored to the demands of its electric powertrain. Through intelligent cooling management, this electric sedan maximizes performance while maintaining ideal battery temperature, pushing the boundaries of electric vehicle innovation.

7. The Jaguar F-PACE SVR features a **not likely to have problems** and well-designed cooling system that effortlessly handles the demands of its high-performance supercharged V8 engine. With enhanced heat dissipation and an intelligent airflow design, this SUV stays cool and composed even during spirited off-road adventures.

8. The Subaru WRX STI boasts a high-performance and **strong and not easily damaged** cooling system, perfectly suited for its turbocharged Boxer engine. With an intercooler setup that ensures minimal heat soak, this rally-inspired sports car maintains consistent power output, providing an adrenaline-fueled driving experience.

9. The McLaren 675LT Spider showcases a precision-engineered and aerodynamically **fine-tuned to achieve the best possible outcome** cooling system, seamlessly integrated into its lightweight carbon fiber bodywork. With advanced airflow management and efficient heat exchangers, this convertible supercar delivers blistering speed without compromising engine reliability.

Task 4.3 *Look over the characteristics of different types of coolant. In pairs, compare three types of coolant using the following phrases and the adjectives from Task 4.1 or your TD:*

more +adjective / adjective + -er than
_____is as + adjective + as _____
_____is not so / as + adjective + as _____
*Both **A** and **B** have _____*
*Unlike **A**, **B** has_____*
***A** (offers) _____, whereas **B** (offers) _____*
*Compared to **A**, **B** _____*
*As opposed to **A, B** _____*

Inorganic Acid Technology (IAT)	**Organic Acid Technology (OAT)**	**Hybrid Organic Acid Technology (HOAT)**
Heat Transfer Efficiency		
IAT generally offers good heat transfer efficiency.	OAT provides excellent heat transfer efficiency.	HOAT offers improved heat transfer efficiency but may vary depending on the specific formulation.
Freezing and Boiling Points		
IAT typically has low freeze	OAT offers good freeze and	HOAT generally provides

protection and high boiling points.	boil protection.	low freeze and boil protection.
Corrosion Protection		
IAT offers moderate corrosion protection due to the presence of inorganic additives.	OAT provides excellent corrosion protection with organic inhibitors.	HOAT provides a balance of corrosion protection by combining organic and inorganic inhibitors.
Longevity and Maintenance		
IAT typically requires frequent replacement and maintenance.	OAT offers extended service intervals and long-lasting performance.	HOAT provides long service life compared to IAT but may not match the extended service intervals of OAT.
Cost-effectiveness		
IAT is cost-effective.	OAT may have a higher initial cost but can offer cost savings in the long run due to extended service intervals.	Its cost-effectiveness can vary depending on the specific formulation and manufacturer recommendations.

Task 4.4 *Work with a partner and prepare a 5-minute presentation about the best currently available antifreeze and coolant fluids. Give you presentation to the group.*

TIP! You can follow the link https://tinyurl.com/yr2zb6yu to find some useful information to make you presentation or use the QR-code:

Lesson 5. HISTORY OF THE COOLING SYSTEM

Task 5.1 *Look over the list of the breakthrough inventions in the automotive industry. Listen and put them in the order you hear them.*

TIP! Follow the link https://tinyurl.com/mtfvyy45 to listen to the list of the breakthrough inventions or use the QR-code:

An automotive water pump, an electric thermostat, an automobile water radiator, a pressurized cooling system, a tubular radiator with fans, the first honeycomb radiator, a water-jacket.

Task 5.2 *Use your TD to help you match the breakthrough inventions in the automotive industry with the year / period of their development.*

1. an automotive water pump	a) 1940s (General Motors engineers)
2. a water-jacket	b) 1894 (Daimler Engine Company)
3. an electric thermostat	c) 1880s (Karl Benz)
4. the automobile water radiator	d) 1886 (Albert Butz)
5. tubular radiators with fans	e) mid-1700s
6. the first honeycomb radiator	f) 1886 (Nicolaus Otto)
7. a pressurized cooling system	g) 1901 (Wilhelm Maybach)

Task 5.3 *Carry out research on the Internet to add some information to the timeline (https://tinyurl.com/3jvtsz5v). Present your timeline to your groupmates and describe the developments in the automotive industry you have added.*

UNIT 4. ELECTRICAL SYSTEM

Introduction

Introductory Tasks. *Follow the link https://tinyurl.com/ypr2kw86 to complete tasks 1-6 or use the QR-code:*

Follow the link https://tinyurl.com/vwyvdb9n to download the Term Dimensions file or use the QR-code:

Lesson 1. ELECTRICAL SYSTEM DESIGN AND OPERATION

Task 1.1 *As an automotive engineer, you should know how the electrical system operates. Read the text below and underline the terms that denote components of the electrical system. Add the missing terms to your TD.*

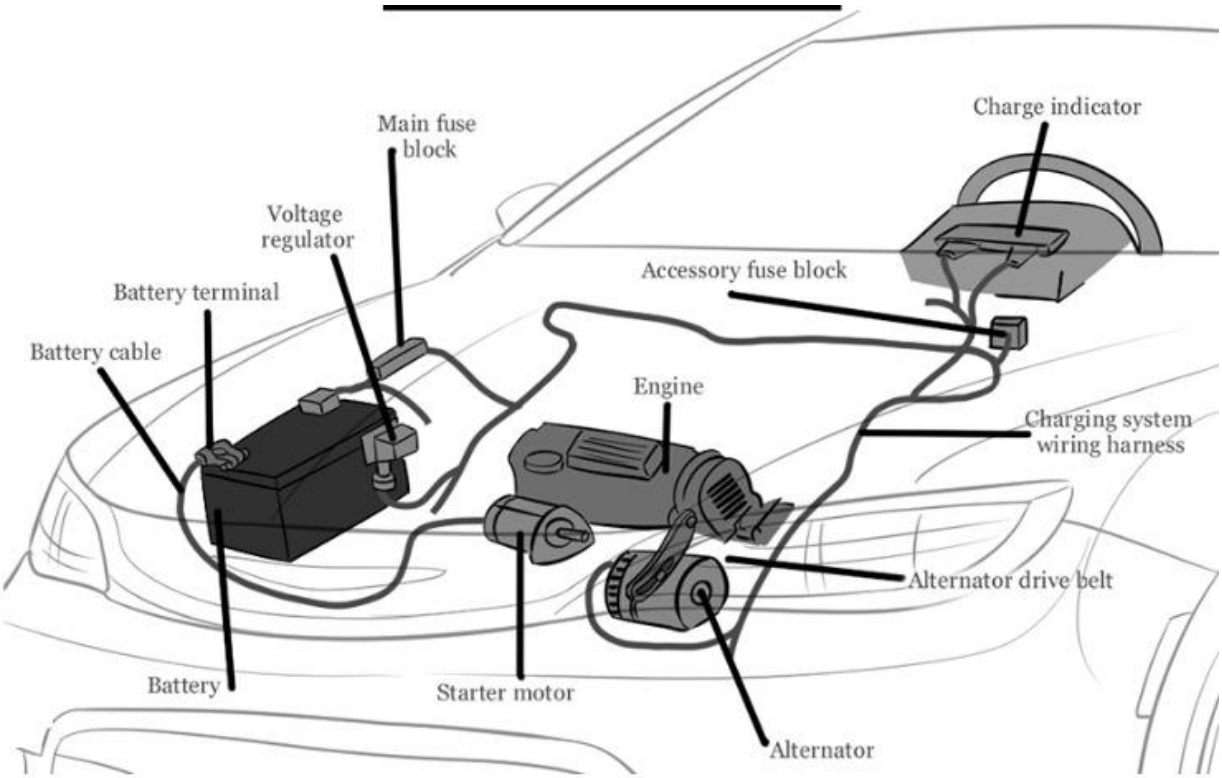
TIP! Follow the link https://multidict.net/cs/11460 to read the "ELECTRICAL SYSTEM DESIGN AND OPERATION" text on Clilstore or use the QR-code:

ELECTRICAL SYSTEM DESIGN AND OPERATION

It’s crucial to understand how the various components interact to ensure the proper functioning of the electrical system. So, let's start with the heart of the electrical system: the battery.

The battery serves as the initial power source, supplying electricity to various components even when the engine is off. It provides energy for starting the engine and powers the electrical accessories when the engine is not running. Additionally, the battery stabilizes voltage fluctuations and acts as a buffer in the system.

Once the engine is running, the alternator takes over the responsibility of generating electrical power. Driven by the engine's mechanical energy, the alternator converts it into electrical energy. Not only does it power the electrical components, but it also charges the battery to ensure its continuous operation.



Now, let's move on to the starter motor, an essential component in the starting process. When you turn the ignition key, the starter motor draws power from the battery, engaging the engine's flywheel. This action initiates the engine's combustion process, igniting the fuel-air mixture and bringing the engine to life.

But how does all this electrical power reach the necessary components? This is where the wiring harness comes into play. The wiring harness is like the nervous system of the vehicle, connecting the electrical components and distributing power throughout the vehicle. It ensures proper electrical connectivity and protects the wiring from damage.

To protect the electrical system from overloads and short circuits, we have the fuse box. The fuse box contains fuses or circuit breakers, which act as safeguards. If an abnormal current flow is detected, the fuse or circuit breaker breaks the electrical circuit, preventing damage to the components and wiring.

Now, let's focus on the switches and relays. Switches are responsible for controlling the operation of various electrical devices, such as headlights, wipers, turn signals, and power windows. On the other hand, relays are electromagnetic switches that control high-current circuits. They allow a small current to control a larger one, ensuring efficient and safe operation of electrical systems.

Moving on to illumination, we have the lighting system. Headlights, taillights, brake lights, turn signals, and interior lights all fall under this category. These lights are crucial for visibility, signaling intentions, and providing illumination for both the driver and passengers.

It’s important to mention sensors. These small yet powerful devices monitor various parameters and provide crucial information to control modules. From the oxygen sensor to the throttle position sensor, ABS sensor, temperature sensor, and many more, sensors enable precise control of vehicle systems for optimal performance and efficiency.

Lastly, we have control modules, the brains of the electrical system. Modules such as the Engine Control Module (ECM) or Powertrain Control Module (PCM) receive inputs from sensors and other components. They analyze this data and make decisions to regulate the operation of various vehicle systems, ensuring smooth functioning and optimal performance.

To add a touch of modernity, we can't forget about audio and entertainment systems, as well as communication and connectivity systems. These include components like the audio head unit, speakers, amplifiers, and navigation systems, offering entertainment, communication, and connectivity features to enhance the driving experience.

So, the electrical system in an automobile is a complex interplay of various components that work together to ensure the proper functioning of the vehicle.

Task 1.2 *Use the information in the text (Task 1.1) and your TD to restore the phrases that can help you describe the steering system components:*

a) VERB + as the initial power source;
b) VERB + electricity to various components;
c) VERB + energy for starting the engine;
d) VERB + the electrical accessories;
e) VERB + mechanical energy into electrical energy;
f) VERB + power from the battery;
g) VERB + power throughout the vehicle;

h) VERB + the electrical circuit;
i) VERB + the operation of various electrical devices;
j) VERB + various parameters;
k) VERB + this data;
l) VERB + the proper functioning of the vehicle.

Task 1.3a *To explain how the electrical system works, you need to know the terms, which denote the components involved in its operation.*

Look over the list of automotive terms. Circle the terms referring to electrical system components.

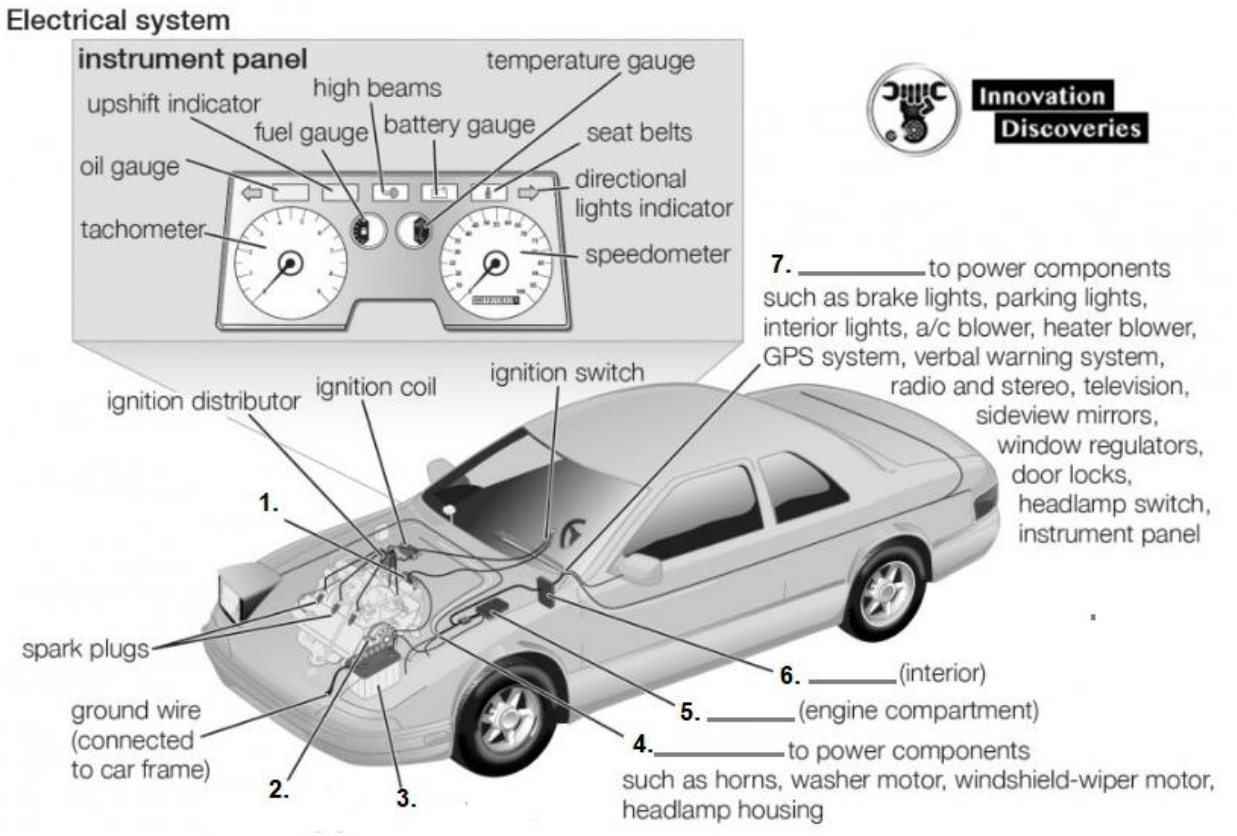
A battery, a leaf coil, an alternator, a shock absorber, a starter motor, an ignition switch, an ignition coil, a hydraulic piston, a distributor (in older systems), spark plugs, a torsion bar, an ignition control module, wiring and cables, fuses, relays, a coil spring, headlights, taillights, a steering knuckle, brake lights, turn signals, power windows, power mirrors, a car stereo, speakers, amplifiers, an instrument cluster, a speedometer, a fuel gauge, a temperature gauge, warning lights.

Task 1.3b *Put the following terms in the order you hear them:*

TIP! Follow the link** https://tinyurl.com/mpucktue **to listen to the list of the terms or use the QR-code:

A battery, an alternator, a starter motor, an ignition switch, an ignition coil, a distributor (in older systems), spark plugs, an ignition control module, wiring and cables, fuses, relays, headlights, taillights, brake lights, turn signals, power windows, power mirrors, a car stereo, speakers, amplifiers, an instrument cluster, a speedometer, a fuel gauge, a temperature gauge, warning lights.

Task 1.3c *Label the unmarked electrical system parts in the picture using the information in the text (see Task 1.1) and your TD:*



Task 1.4a *Watch a professional review and restore its script by filling in the gaps with the verbs (in the active or passive voice) describing the actions of electrical system components.*

TIP! Follow the link to watch the review *https://tinyurl.com/2u3xunnp* ***or use the QR-code:***

An engine starter motor is a powerful electric motor used for cranking an engine. The starter motor has a pinion which 1._____ with the teeth on the flywheel of the engine and 2._____ the crankshaft. The model shown here is a preengaged type starter motor used in modern vehicles. It uses an electric motor to 3._____ torque to the crankshaft. The power for this motor can be drawn from the battery. A simplified circuit of power supply is shown here. The power from the battery is 4._____ to a solenoid. An ignition switch is 5._____ between the battery and the solenoid to turn the power on and off. The solenoid is an electromagnet which requires small current to get energized. As the ignition switch is 6._____ on, the solenoid gets energized. A moving core, known as a plunger, slides along the coil which connects two copper terminals of a contactor switch. This completes the circuit from the battery to the motor and causes the rotor to

spin. When the solenoid is deenergized, the core returns back and 7._____ the motor from the battery. The solenoid has another crucial function. It helps to 8._____ the pinion and 9._____ it with a flywheel before the motor starts to 10._____. As the pinion slides towards the flywheel, it slightly 11._____ on its axis as shown here. This rotation is achieved by using a helical spline. This rotation helps meshing the pinion with the flywheel ore conveniently. As the pinion and flywheel is properly meshed, the contactor switch gets closed and the motor spins. As we can observe that the pinion is considerably small compared to the flywheel. The gear ratio of the flywheel and pinion is generally from 15 to 1 to 20 to 1. As the engine is started, the pinion needs to be disengaged from the flywheel to prevent backdrive of the motor which might damage it due to the excessive speed. This is done by releasing the ignition switch which 12._____ the solenoid and opinion returns back.

Task 1.4b *Add the verbs you inserted (Task 1.4a) to your TD. Connect them and the electrical system components (from the blue segment of your TD) performing the actions these verbs describe.*

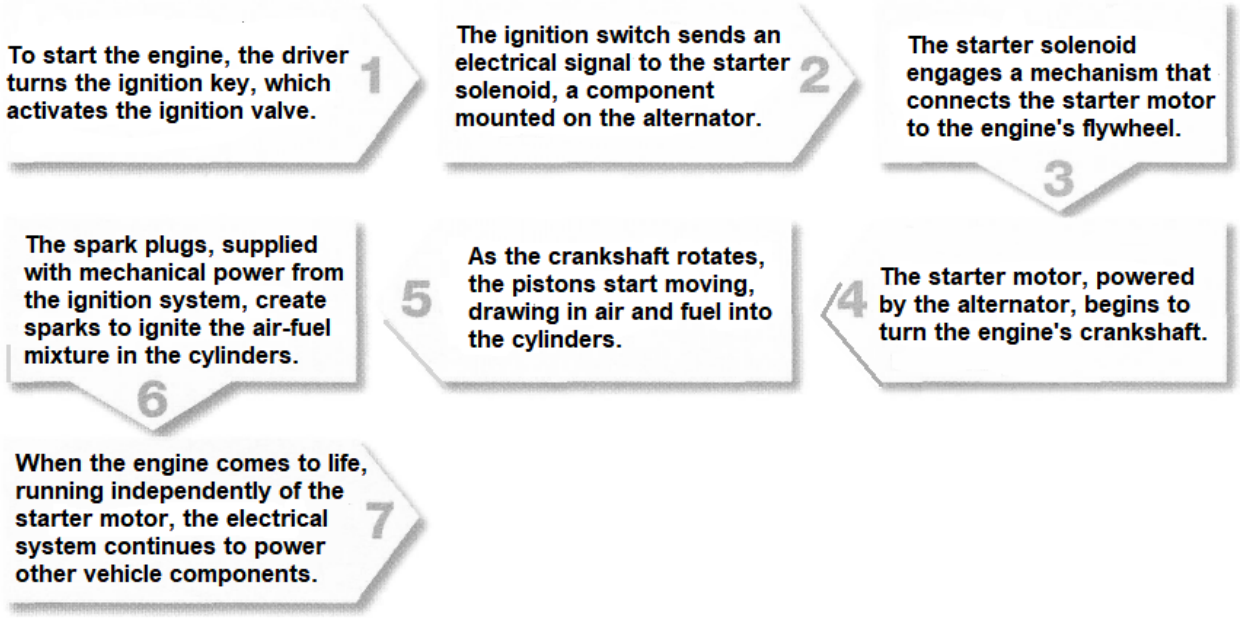
Task 1.5a *Replace the underlined verbs, which denote the actions of the electrical system parts, with their synonyms using the following list of words:*

transform	transfer	supply	enable
break	produce	secure	avoid

1. The battery <u>provides</u> electrical power to start the engine.
2. The alternator <u>generates</u> electricity while the engine is running. It charges the battery and provides power to the electrical systems.
3. The starter motor cranks the engine and <u>initiates</u> its combustion process. It draws a high amount of electrical power from the battery and <u>converts</u> it into mechanical energy to turn the engine's crankshaft.
4. Wiring and cables <u>transmit</u> power from the battery and alternator to different systems and components throughout the vehicle.
5. Fuses prevent damage to the electrical system as they <u>interrupt</u> the electrical circuit when an excessive current flow occurs. They help <u>protect</u> against electrical faults and prevent electrical component damage or fires.
6. Relays control the flow of electrical current to various components. They <u>allow</u> components to be activated or deactivated as needed, providing efficient and controlled power distribution.

Task 1.5b *Add the verbs from the list (Task 1.5a) to the red segment of your TD. Connect them and the electrical system components, performing the actions these verbs describe.*

Task 1.6 *Study the diagram. Use the information in the text (see Task 1.1) and your TD to identify 4 words that are used incorrectly.*



Task 1.7 *Student A: You are a professional engineer invited to deliver a lecture at a university. Study the electrical system simulation and describe its operation to the students using the simulation.*

TIP! Follow the link to watch the simulation *https://tinyurl.com/47abe522* ***or use the QR-code:***

Student B: You are a student. You are going to listen to the lecture on the electrical system delivered by a professional engineer. Prepare 10 questions concerning its operation you would like to know the answers to. Listen to the lecture. At the end of the lecture, ask the questions that haven't been answered by the lecturer.

Lesson 2. ELECTRICAL SYSTEM MAITENANCE

Task 2.1a *As an automotive engineer, you should be able to provide car owners with the guidance on keeping their electrical system in the best condition.*

Listen to 4 descriptions that will help you explain why electrical system parts need to be regularly maintained. Match them with the pictures (a-d).

TIP! Follow the link to listen to the descriptions *https://tinyurl.com/3jbms5jy* ***or use the QR-code:***

a) a battery	b) an alternator	c) a starter motor	d) fuses
			

Speaker:	1.	2.	3.	4.

Task 2.1b *Listen again and restore the phrases that will help you develop the guidance:*

a) VERB + electrical power;

b) VERB + reliable starting power / its optimal performance and longevity / proper charging / proper engagement with the flywheel;

c) VERB + power to the electrical systems;

d) VERB + the battery;

e) VERB + the drive belt for wear and tension / wiring connections;

f) VERB + safeguard electrical circuits.

Task 2.1c *Use the information from the chart below, tasks 2.1a and 2.1b, and your TD to create the guidance giving essential tips on keeping the electrical system in the best condition. Explain: 1) what electrical system parts should be checked; 2) how often they should be checked and 3) why it's a good idea to check them. Use the following phrases:*

- It's generally best/a good idea to...
- One thing you should/have to do is ...
- The best/most important thing (to do) is to ...
- The main recommendation is/would be…

Maintenance Interval	Number of month or kilometers (miles), whichever comes first								
	Months	6	12	18	24	30	36	42	48
	x1000 km	12	24	36	48	60	72	84	96
	x1000 miles	7.5	15	22.5	30	37.5	45	52.5	60
ELECTRICAL SYSTEM									
Battery		Ch/C	Ch/C	Ch/C	Ch/C	Ch/C	Ch/C	Ch/C	Ch/C
Alternator (drive belt)		I	I	I	I	I	I	I	I
Alternator (output voltage)			Ch		Ch		Ch		Ch
Starter Motor				T			T		
Wiring and Cables			I		I		I		I

Chart symbols: Ch: Check; C: Clean; I: Inspect; T: Test.

Lesson 3. SYMPTOMS AND CAUSES OF STEERING COMPONENTS FAULTS

Task 3.1 *A qualified automotive engineer is able to explain the symptoms and causes of electrical system faults.*

Read the text below and use the information in the text and your TD to restore the phrases that will help you create an infographic for car owners to detect defective electrical system components:

a) VERB + problems promptly;
b) ADJECTIVE + headlights;
c) VERB + to difficulties;
d) have your alternator's output voltage + VERB+ed;
e) have your starter motor + VERB +ed;
f) ADJECTIVE (x2) + noises;
g) ADJECTIVE + fuse connections;
h) VERB + the reliability and safety of your vehicle's electrical system.

WARNING SIGNS OF ELECTRICAL SYSTEM PROBLEMS

It's crucial to be aware of potential issues with the vehicle's electrical system. Recognizing warning signs can help you address problems promptly and prevent further damage. Follow these steps to identify warning signs and take necessary action.

Watch out for dim headlights, slow cranking, or an illuminated battery warning light on your dashboard. If you notice these signs, have your battery tested and terminals checked for corrosion. Replace the battery if needed. Ig-

noring battery problems may lead to difficulties starting the engine, loss of power to electrical systems, and potential damage to other components.

Pay attention to a battery warning light, flickering or dimming lights, and electrical system malfunctions. When these signs occur, have your alternator's output voltage checked and the drive belt inspected for wear and tension. Addressing alternator problems promptly is crucial to ensure proper battery charging, power supply to electrical systems, and avoiding potential damage.

Be alert for clicking or grinding noises during startup, slow cranking, or intermittent starting issues. If you experience these signs, have your starter motor and related wiring connections inspected. Taking care of starter motor problems in a timely manner helps ensure reliable engine starting and prevents potential breakdowns.

Look out for non-functional electrical systems, blown fuses, melted fuse connections, or a burning smell. When you encounter these signs, check and replace damaged fuses as needed. Ignoring fuse issues can result in the loss of power to electrical systems, potential wiring damage, or even electrical fires.

By following these instructions, you can actively monitor your vehicle's electrical system and recognize warning signs of component problems. Addressing these issues promptly will help maintain the reliability and safety of your vehicle's electrical system.

Task 3.2 *Follow the link https://tinyurl.com/yttw63nk to view the "Reasons Why Your Audi Battery Light is On While Driving" infographic. Use it as an example to create the infographic to help car owners detect faulty electrical system components. In your infographic use the phrases from Task 3.1 and your TD. Include the information about: 1) each electrical system element function; 2) the symptoms of its malfunction; 3) the causes of its malfunction; 4) your recommendations.*

You can use https://app.genial.ly/templates/infographics or any other tool to create your infographic.

Lesson 4. ASSESSMENT OF THE ELECTRICAL SYSTEM

Task 4.1 *As an automotive engineer, you will assess the electrical system performance and safety.*

Look over the list of adjectives (from your TD) that can help you describe electrical system performance. Listen and put them in the table below according to their stress pattern:

TIP! Follow the link to listen to the list of the adjectives *https://tinyurl.com/334ynzs6* ***or use the QR-code:***

Responsive, innovative, powerful, dependable, functional, safe, versatile, integrated.

O	Ooo	oOo	oOoo	Oooo

Task 4.2 *Replace the definitions provided in bold with the appropriate adjectives from Task 4.1 or your TD.*

1. The **able to be trusted to do what you need or expect** electrical system of the Toyota Camry ensures smooth operation and reliable performance on every journey.
2. The **working correctly** electrical system of the Volkswagen Golf GTI seamlessly integrates driver-assist features and entertainment capabilities.
3. The **new, different, and better than those that existed before** electrical system of the BMW i3 combines cutting-edge electric propulsion with advanced connectivity for a truly futuristic driving experience.
4. The **combines many different parts** electrical components in the Mercedes-Benz E-Class create a seamless and harmonious driving environment, blending luxury and technology.
5. The **very effective and can do a lot** electrical system in the Chevrolet Corvette Z06 ensures exhilarating acceleration and lightning-quick responsiveness.
6. The **reacting quickly** electrical controls in the Audi A4 enhance driver engagement, providing precise handling and a dynamic driving experience.
7. The **not likely to cause any physical injury or harm** electrical system of the Volvo XC90 incorporates advanced safety features, including intelligent collision avoidance and comprehensive airbag protection.
8. The **having many different uses** electrical system of the Jeep Wrangler allows for customization options, supporting various off-road accessories and lighting configurations.

Task 4.3 *Look over the characteristics of different types of batteries below and compare them using the following phrases and the adjectives from Task 4.1 or your TD:*

more +adjective / adjective + -er than
_____is as + adjective + as _____
_____is not so / as + adjective + as _____
*Both **A** and **B** have _____*
*Unlike **A**, **B** has_____*
***A** (offers) _____, whereas **B** (offers) _____*
*Compared to **A**, **B** _____*

As opposed to ***A, B*** _____

Lithium-Ion Batteries	Lead-Acid Batteries	SLI Batteries	Deep Cycle Batteries
Capacity			
They offer high energy capacity and can deliver consistent power output throughout their discharge cycle.	They generally have low energy capacity, but they can provide sufficient power for starting engines.	They are primarily designed for high-current starting applications, so their capacity may be lower compared to deep cycle batteries.	They have high capacity and are optimized for discharging at lower rates over a longer duration.
Lifespan			
They are known for their long lifespan, often lasting several years.	They typically have a short lifespan but can provide reliable service for automotive applications.	They are similar to lead-acid batteries, they have a limited lifespan and may require replacement after a few years.	They can have a long lifespan, as they are designed for deep discharges and repeated cycling.
Maintenance Requirements			
The are generally maintenance-free and require minimal attention.	They may require periodic electrolyte level checks and occasional topping up with distilled water.	They may require periodic electrolyte level checks and occasional topping up with distilled water.	They may require periodic electrolyte level checks and occasional topping up with distilled water.
Cost			
High	Low	Low	Moderate

Task 4.4 *Work with a partner and prepare a 5-minute presentation. Compare different types of batteries. Give you presentation to the group.*

TIP! You can follow the link *https://tinyurl.com/2x2bztzt* ***to find some useful information to make you presentation or use the QR-code:***

Lesson 5. HISTORY OF THE ELECTRICAL SYSTEM

Task 5.1 *Look over the list of the breakthrough inventions in the automotive industry. Listen and put them in the order you hear them.*

TIP! Follow the link *https://tinyurl.com/ax3ksk65* ***to listen to the list of the list of the breakthrough inventions or use the QR-code:***

A fast acting protective fuse, a fuel cell, an electric starter motor, the first car battery, the first electric starter, the first maintenance free batteries for passenger cars, batteries with plastic case and state of charge indicators, grid with silver alloy for long life and high starting power, AGM batteries for commercial vehicles.

Task 5.2 *Use your TD and carry out research on the Internet to help you match the breakthrough inventions in the automotive industry with the year / period of their development.*

1. a fuel cell	a) 1911
2. an electric starter motor	b) 1920s
3. an electric ignition starter	c) 1840
4. the first car battery	d) 1960s
5. a fast acting protective fuse	e) 1912
6. batteries with plastic case and state of charge indicators	f) 1980
7. the first maintenance free batteries for passenger cars	g) 1927

Task 5.3 *Carry out research on the Internet to add some information to the timeline (https://tinyurl.com/ypr2kw86). Present your timeline to your groupmates and describe the developments in the automotive industry you have added.*

UNIT 5. HVAC SYSTEM

Introduction

Introductory Tasks. *Follow the link https://tinyurl.com/3wbr798d to complete tasks 1-6 or use the QR-code:*

Follow the link https://tinyurl.com/vwyvdb9n to download the Term Dimensions file or use the QR-code:

Lesson 1. HVAC SYSTEM DESIGN AND OPERATION

Task 1.1 *As an automotive engineer, you should know how the HVAC system operates. Read the text below and underline the terms that denote components of the HVAC system. Add the missing terms to your TD.*

TIP! Follow the link https://multidict.net/cs/11461 to read the "HVAC SYSTEM DESIGN AND OPERATION" text on Clilstore or use the QR-code:

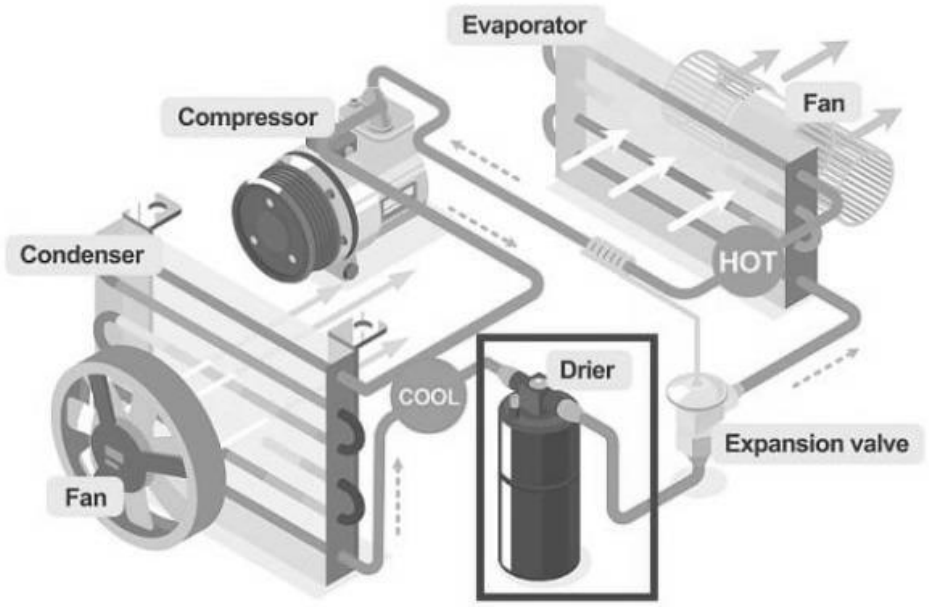
HVAC SYSTEM DESIGN AND OPERATION

When a driver or a passenger sets the desired temperature, fan speed, and airflow direction on the control panel, it sends signals to the various components to initiate the HVAC system's operation.

Once the HVAC system is activated, the blower motor starts to operate at the selected speed. It draws in ambient air from outside or recirculates cabin air, depending on the setting, and forces it through the system.

The ambient air or recirculated cabin air passes through the air intake and cabin air filter. The filter helps remove dust, pollen, and other particles from the air, enhancing the air quality before it enters the system.

If the heating operation is requested, the control panel adjusts the blend door or valve to allow engine coolant to flow through the heater core. The blower motor forces air over the heated heater core, warming the air.



If the cooling operation is requested, the control panel activates the air conditioning system. Here's how it works.

The control panel sends a signal to engage the compressor. The compressor, driven by the engine, begins to circulate refrigerant through the system. The high-pressure refrigerant flows into the condenser, located in front of the vehicle's radiator. As air passes over the condenser, the heat from the refrigerant is released, causing the refrigerant to condense into a high-pressure liquid. The high-pressure liquid refrigerant then enters the expansion valve or orifice tube. These components regulate the flow of refrigerant, causing a pressure drop and allowing the refrigerant to expand into a low-pressure vapor. The low-pressure refrigerant enters the evaporator, typically located behind the dashboard. As the blower motor forces air over the evaporator coil, the refrigerant absorbs heat from the air, resulting in cooled air being blown into the cabin. The blower motor pushes the cooled air through the air ducts and vents, distributing it evenly throughout the vehicle's cabin. The airflow direction is controlled by adjusting the vent positions.

Throughout the HVAC system's operation, various sensors monitor the cabin temperature and refrigerant pressure. The control panel receives feedback from these sensors and adjusts the blend door, valve positions, compressor clutch, and blower motor speed to maintain the desired temperature.

If the recirculation mode is selected, the control panel activates a recirculation door or valve. This prevents outside air from entering the system, allowing for the recirculation of cabin air. Recirculation mode is useful when trying to maintain a specific cabin temperature or reduce outside odors.

The driver or passengers can make adjustments to the temperature, fan speed, and airflow direction at any time during the HVAC system's operation. The control panel relays these changes to the respective components for immediate adjustment.

When the HVAC system is turned off, the control panel signals the components to cease operation. The blower motor stops, the compressor disengages, and the various valves and doors return to their default positions.

This test provides a general overview of how an automobile HVAC system operates. The specific operation and interactions of components may vary between vehicle models and manufacturers, but the overall principles remain similar.

Task 1.2 *Use the information from the text (see Task 1.1) and your TD to restore the phrases that can help you describe the HVAC system components:*

a) VERB + the desired temperature;
b) VERB + in ambient air from outside;
c) VERB + cabin air;
d) VERB + through the air intake and cabin air filter;
e) VERB + dust, pollen, and other particles from the air;
f) VERB + through the heater core;
g) VERB + refrigerant through the system;
h) the refrigerant + VERB + heat from the air;
i) VERB + the cooled air evenly throughout the vehicle's cabin;
j) VERB + the vent positions / the blend door;
k) monitor / maintain the cabin + NOUN.

Task 1.3a *To explain how the HVAC system works, you need to know the terms, which denote the components involved in its operation.*

Look over the list of automotive terms. Circle the terms referring to the HVAC system components.

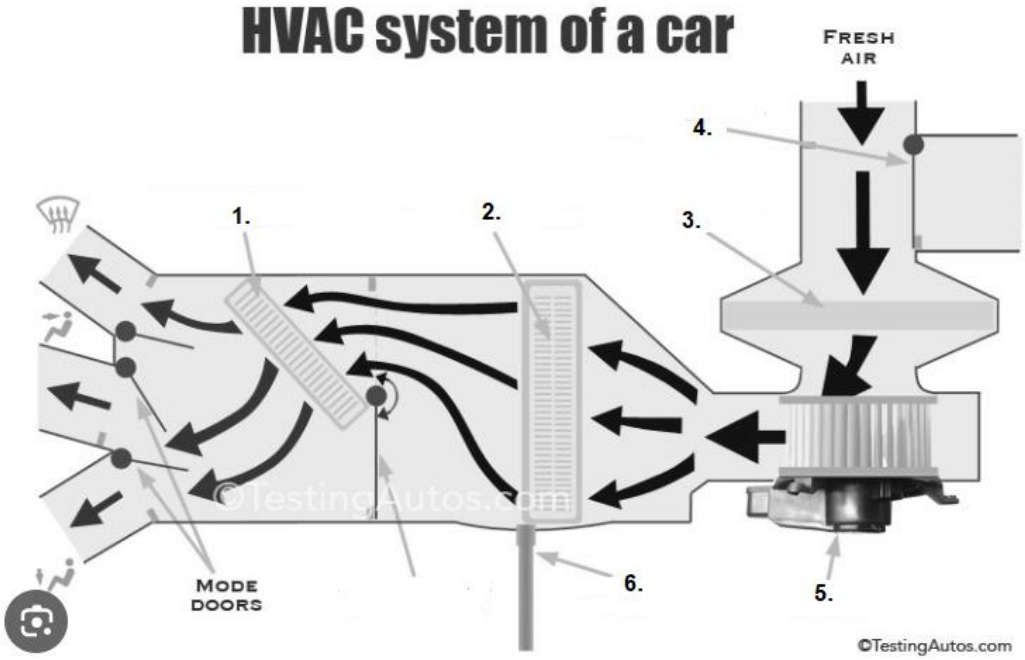
A compressor, a speedometer, a condenser, an expansion valve, an evaporator, a blower motor, a heater core, a control panel, a spark plug, power windows, a cabin air filter, an air intake, a blend door or valve, a camshaft, temperature sensors, a tie rod, a coil spring, pressure sensors, ambient light sensors, a mode selector, a recirculation door or valve, air ducts and vents, refrigerant lines, an AC clutch, an AC pressure switch, a rotor, an AC relay, a piston, a high-pressure switch, a low-pressure switch, an HVAC control module, wiring and electrical connections, a fan speed resistor or module, a fresh air inlet, vent mode actuators, a heater control valve, heater hoses, defrost vents.

Task 1.3b *Put the following terms in the order you hear them:*

TIP! Follow the link to listen to the list of the terms https://tinyurl.com/2ffvembd or use the QR-code:

A compressor, a condenser, an expansion valve, an evaporator, a blower motor, a heater core, a control panel, a cabin air filter, an air intake, a blend door or valve, temperature sensors, pressure sensors, ambient light sensors, a mode selector, a recirculation door or valve, air ducts and vents, refrigerant lines, an AC clutch, an AC pressure switch, an AC relay, a high-pressure switch, a low-pressure switch, an HVAC control module, wiring and electrical connections, a fan speed resistor or module, a fresh air inlet, vent mode actuators, a heater control valve, heater hoses, defrost vents.

Task 1.3c *Label the unmarked HVAC system parts in the picture using the information in the text (see Task 1.1) and your TD:*



Task 1.4a *Watch a professional review and restore its script by filling in the gaps with the verbs / verb forms describing the actions of the HVAC system parts.*

TIP! Follow the link to watch the https://tinyurl.com/ypkhh77a or use the QR-code:

more relaxed and cool. And the driver is then able to concentrate on driving, which leads to increased road safety. Air conditioning operation relies on 2._____ the heat out of the passenger compartment by 3._____ the heat into a refrigerant that 4._____ the heat away from the passenger compartment so that it can be 5._____ to the outside air.

Task 1.4b *Add the verbs you inserted (Task 1.4a) to your TD. Connect them and the HVAC system components (from the blue segment of your TD) performing the actions these verbs describe.*

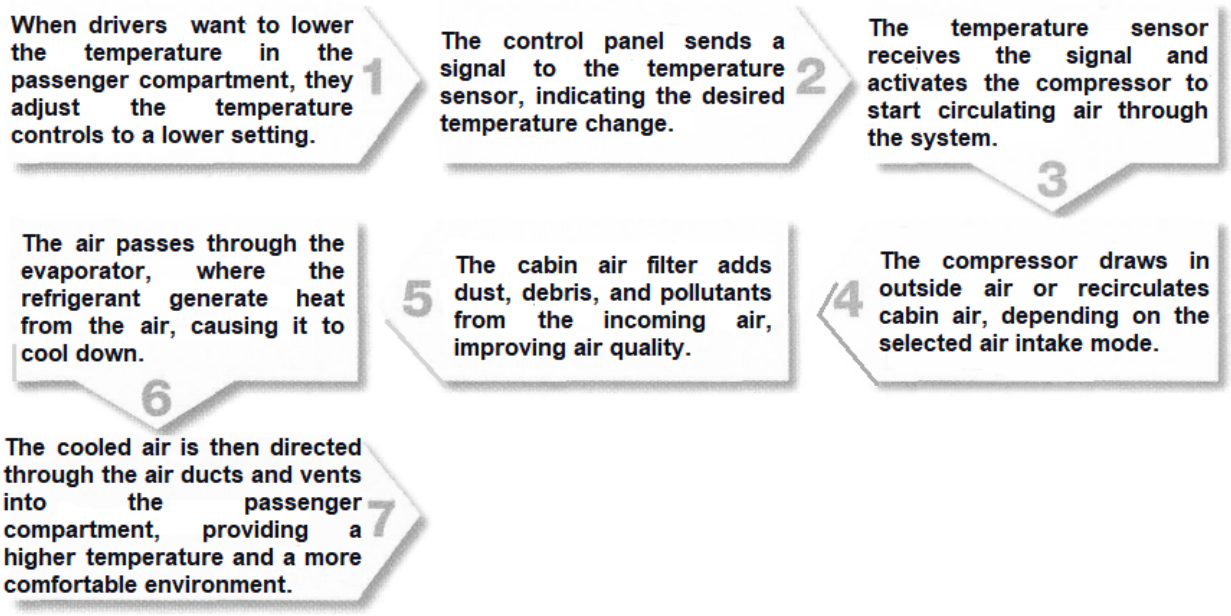
Task 1.5a *Replace the underlined verbs, which denote the actions of the HVAC system parts, with their synonyms using the following list of words:*

enable	take in	regulate	track	pump
heat	control	radiate	cleanse	enhance

1. A compressor circulates refrigerant to facilitate the cooling process.
2. A condenser releases heat from the refrigerant, causing it to condense into a high-pressure liquid.
3. An expansion valve regulates the flow of refrigerant and creates a pressure drop for effective cooling.
4. An evaporator absorbs heat from the air, cooling it down as the refrigerant evaporates.
5. A blower motor circulates air through the HVAC system and into the vehicle's cabin.
6. A heater core uses engine coolant to warm the air for heating operation.
7. A control panel allows users to adjust the temperature, fan speed, and airflow direction.
8. A cabin air filter purifies the air entering the cabin, improving air quality.
9. A blend door or valve controls the mixture of hot and cold air for desired temperature regulation.
10. Temperature sensors monitor and provide feedback on the cabin temperature.

Task 1.5b *Add the verbs from the list (Task 1.5a) to the red segment of your TD. Connect them and the HVAC system components, performing the actions these verbs describe.*

Task 1.6 *Study the diagram. Use the information in the text (see Task 1.1) and your TD to identify 7 words that are used incorrectly.*



Task 1.7 *Student A: You are a professional engineer invited to deliver a lecture at a university. Study the HVAC system simulation and describe its operation to the students using the simulation.*

TIP! Follow the link to watch the simulation *https://tinyurl.com/2p8m8a4e* ***or use the QR-code:***

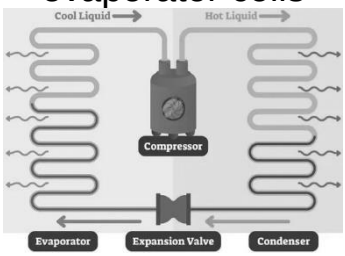
Student B: You are a student. You are going to listen to the lecture on the HVAC system delivered by a professional engineer. Prepare 10 questions concerning its operation you would like to know the answers to. Listen to the lecture. At the end of the lecture, ask the questions that haven't been answered by the lecturer.

Lesson 2. HVAC SYSTEM MAITENANCE

Task 2.1a *As an automotive engineer, you should be able to provide car owners with the guidance on keeping their HVAC system in the best condition.*

Listen to 4 descriptions that will help you explain why HVAC system parts need to be regularly inspected. Match them with the pictures (a-d).

TIP! Follow the link to listen to the descriptions *https://tinyurl.com/mv6bx6wx* ***or use the QR-code:***

a) a blower motor	b) a refrigerant level	c) condenser and evaporator coils	d) an air filter
			

Speaker:	1.	2.	3.	4.

Task 2.1b *Listen again and restore the phrases that will help you develop the guidance:*

a) VERB + air;
b) VERB + proper functioning / optimal airflow / adequate ventilation / better air quality;
c) VERB + traps dust / pollen;
d) VERB + efficient heat transfer;
e) VERB + cooling performance;
f) VERB + the accumulation of dirt and debris;
g) VERB + their operation;
h) absorb / release + NOUN;
i) identify any + NOUN.

Task 2.1c *Use the information from the chart below, tasks 2.1a and 2.1b, and your TD to create the guidance giving essential tips on keeping the HVAC system in the best condition. Explain: 1) what HVAC system parts should be checked; 2) how often they should be checked and 3) why it's a good idea to check them. Use the following phrases:*

- It's generally best/a good idea to...
- One thing you should/have to do is ...
- The best/most important thing (to do) is to ...
- The main recommendation is/would be…

Maintenance Interval	Number of month or kilometers (miles), whichever comes first								
	Months	6	12	18	24	30	36	42	48
	x1000 km	12	24	36	48	60	72	84	96
	x1000 miles	7.5	15	22.5	30	37.5	45	52.5	60
HVAC SYSTEM									
Air Filter					I/R				I/R
Blower Motor and Fan					I/L				I/L
Belts and Pulleys									I/R
Condenser and Evaporator Coils	Clean annually or as needed								
Refrigerant Levels	Check every 2-3 years or as needed								
Electrical Connections and Wiring	Inspect annually or as needed								

Chart symbol: I: Inspect; L: Lubricate; R: Replace

Lesson 3. SYMPTOMS AND CAUSES OF THE HVAC SYSTEM FAILURE

Task 3.1 *A qualified automotive engineer is able to explain the symptoms and causes of HVAC system faults.*

Read the text below and use the information in the text and your TD to restore the phrases that will help you create an infographic for car owners to detect HVAC components failure:

a) VERB + a comfortable and controlled environment / the desired temperature;
b) be + NOUN + to wear, tear, and failure;
c) VERB + appropriate action;
d) VERB + inconvenient breakdowns / costly repairs / failures;
e) ADJECTIVE + airflow;
f) ADJECTIVE + odors;
g) ADJECTIVE (x3) + noise;
h) a + ADJECTIVE + blower motor;
i) ADJECTIVE + belts;
j) ADJECTIVE + air filters;
k) a + ADJECTIVE + blend door;
l) a + ADJECTIVE + condenser.

WARNING SIGNS OF THE HVAC SYSTEM FAILURE

The automotive HVAC (Heating, Ventilation, and Air Conditioning) system plays a crucial role in maintaining a comfortable and controlled environment within a vehicle. However, like any other system, HVAC components are subject to wear, tear, and failure over time. Recognizing the warning signs of potential failures, understanding their causes, and taking appropriate action can

prevent inconvenient breakdowns, costly repairs, and ensure passenger comfort and safety. We will explore some common warning signs of HVAC component failures.

One of the early warning signs of HVAC component failure is weak airflow. If you notice a significant reduction in the amount of air coming from the vents, it may indicate problems with the blower motor, clogged air filters, or duct obstructions. Restricted airflow can lead to poor ventilation, inefficient cooling or heating, and discomfort for the occupants.

Unusual odors from the HVAC system can be an indication of problems. These odors can stem from mold or bacterial growth in the evaporator or cabin air filter, or even from a malfunctioning HVAC control module. Ignoring these odors not only compromises air quality but can also lead to health issues and discomfort for passengers.

Unusual or excessive noise during HVAC system operation should not be ignored. A squealing noise may suggest a worn-out blower motor or loose belts, while clicking or rattling sounds may indicate loose or damaged components. Ignoring these noises can result in further damage to the affected components and compromise the overall performance of the HVAC system.

If you experience inconsistent cooling or heating performance, such as the inability to maintain the desired temperature or uneven temperature distribution, it could point to a failing compressor, a malfunctioning blend door or valve, or refrigerant leaks. Inconsistent temperature control not only affects passenger comfort but may also indicate potential system damage if left unaddressed.

The presence of fluid leaks, such as water or refrigerant, beneath the vehicle or inside the cabin, should raise concerns. Leaking fluids can stem from issues like a faulty condenser, evaporator, or refrigerant lines. Ignoring fluid leaks can lead to system inefficiency, potential damage to other components, and increased risk of refrigerant leaks into the atmosphere.

Recognizing the warning signs of automotive HVAC component failures is crucial for timely action and maintenance. Neglecting these signs can result in compromised comfort, poor air quality, increased repair costs, and even potential safety hazards. Regular inspections, proper maintenance, and timely repairs by qualified professionals can help prevent these failures, extend the lifespan of the HVAC system, and ensure a pleasant and safe driving experience for all occupants.

Task 3.2 *Follow the link https://tinyurl.com/3sb4u9au to view the "Warning Signs that Indicate Immediate Air Conditioner Repair" infographic. Use it as an example to create the infographic to help car owners detect faulty HVAC system components. Include the information about: 1) each HVAC system element function; 2) the symptoms of its malfunction; 3) the causes of its malfunction; 4) your recommendations.*

You can use https://app.genial.ly/templates/infographics or any other tool to create your infographic.

Lesson 4. ASSESSMENT OF THE HVAC SYSTEM

Task 4.1 *As an automotive engineer, you will assess the HVAC system performance and safety.*

Look over the list of adjectives (from your TD) that can help you describe HVAC system performance. Listen and put them in the table below according to their stress pattern:

TIP! Follow the link to listen to the list of the adjectives *https://tinyurl.com/3uc5xsjj* ***or use the QR-code:***

Adjustable, well-balanced, consistent, eco-friendly, functional, modern, optimized, precise, quiet, state-of-the-art.

Oo	oO	Ooo	oOo	oOoo	oooO	Oooo

Task 4.2 *Replace the definitions provided in bold with the appropriate adjectives from Task 4.1 or your TD.*

1. Immerse yourself in the luxurious cabin of the XYZ Luxury Sedan, where the **exact, accurate** HVAC system employs advanced sensors and sophisticated algorithms to maintain the perfect balance of temperature and humidity, delivering an unmatched level of comfort and refinement.
2. The **using the most modern and recently developed methods, materials, or knowledge** HVAC system in the ABC Sports Car showcases a level of precision and sophistication rarely seen in its class. With intuitive touchscreen controls and intelligent climate management, this vehicle ensures that every drive is a seamless blend of exhilaration and comfort, tailored to the driver's exact preferences.
3. The **not making much noise** operation of the DEF Hatchback's AC system creates a serene cabin environment, allowing you to enjoy a peaceful and relaxing drive.

4. Step into the XYZ Coupe and be amazed by its **made or done using the most recent designs or methods** HVAC system, seamlessly integrated into the sleek interior design, providing both functionality and aesthetic appeal.

5. The highly **improved to make it as effective as possible** HVAC system in the GHI Sedan guarantees consistent and efficient airflow, maintaining a comfortable cabin environment while minimizing energy consumption.

6. With **can be changed to make it suitable for different purposes** air vents and temperature settings, the JKL SUV's HVAC system puts you in control, allowing you to personalize your comfort preferences for every season.

7. The **having the right amounts of all the different parts that make up something** HVAC system of the MNO Minivan ensures uniform air distribution to all seating rows, keeping every passenger content and refreshed during long journeys.

8. The PQR Electric Vehicle's **not harmful to the environment** HVAC system utilizes energy-saving technologies, reducing environmental impact without compromising on comfort or performance.

Task 4.3 *Look over the chart below and compare the characteristics of two commonly used HVAC systems: the expansion valve system and the fixed orifice tube system. Use the following phrases and the adjectives from Task 4.1 or your TD:*

more +adjective / adjective + -er than
_____is as + adjective + as _____
_____is not so / as + adjective + as _____
*Both **A** and **B** have _____*
*Unlike **A**, **B** has_____*
***A** (offers) _____, whereas **B** (offers) _____*
*Compared to **A**, **B** _____*
*As opposed to **A, B** _____*

Expansion Valve HVAC System	Fixed Orifice Tube HVAC System
Efficiency	
more efficient	relatively less efficient
Cooling Performance	
better cooling performance	less effective cooling
Control and Regulation	
precise control of refrigerant flow	limited control and fixed flow
Maintenance and Repair	
may require occasional servicing and adjustment	generally simpler and less prone to failure
Cost	
typically higher initial cost	lower initial cost
Adaptability to Conditions	
adapts to varying conditions for optimal cooling	limited ability to adapt to changing conditions
Overall Performance	
higher cooling capacity and efficiency	adequate cooling performance

Task 4.4 *Work with a partner and prepare a 5-minute presentation about automotive HVAC market trends. Give you presentation to the group.*

TIP! You can follow the link to find some useful information to make you presentation *https://tinyurl.com/yvt6cw74* ***or use the QR-code:***

Lesson 5. HISTORY OF THE AUTOMOTIVE HVAC SYSTEM

Task 5.1 *Look over the list of the breakthrough inventions in the automotive industry. Listen and put them in the order you hear them.*

TIP! Follow the link to listen to the list of the list of the breakthrough inventions *https://tinyurl.com/5x9eayme* ***or use the QR-code:***

A car cooler, a modern air conditioning system, an air cooling unit for automobiles, the Airtemp, the Chrylser's air conditioning system, the first automotive air conditioner, the Knapp Limo-Sedan fan, a ventilated seat cushion.

Task 5.2 *Use your TD and carry out research on the Internet to help you match the breakthrough inventions in the automotive industry with the year of their development.*

1. a ventilated seat cushion	a) 1921
2. the Knapp Limo-Sedan Fan (an aftermarket electric fan)	b) 1953 (Chrysler)
3. a car cooler (a canister filled with water)	c) 1919
4. an air cooling unit for automobiles	d) 1939 (Packard)
5. the first automotive air conditioner (temperature couldn't be adjusted)	e) 1954 (Nash Ambassador)
6. the Chrylser's air conditioning system (possible to control the blower speed)	f) 1930
7. a modern air conditioning system (capable of heating, cooling, and ventilating)	e) 1935 (Ralph Peo of Houde Engineering)

Task 5.3 *Carry out research on the Internet to add some information to the timeline (https://tinyurl.com/3wbr798d). Present your timeline to your groupmates and describe the developments in the automotive industry you have added.*

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Составители:
Прокопюк Ольга Васильевна

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