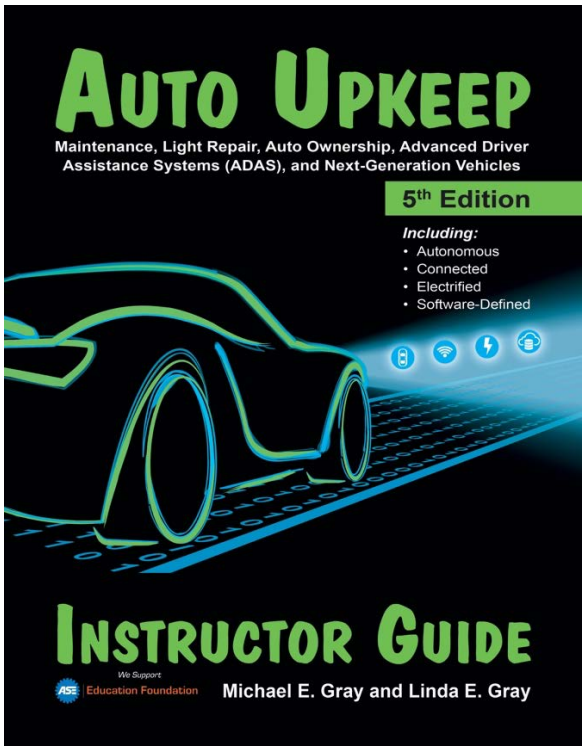
Auto Upkeep

5th Edition



Instructor Guide

Sample Pages

Rolling Hills Publishing
www.rollinghillspublishing.com

Auto Upkeep Instructor Guide: Maintenance, Light Repair, Auto Ownership, Advanced Driver Assistance Systems (ADAS), and Next-Generation Vehicles (Including: Autonomous, Connected, Electrified, and Software-Defined)

5th Edition

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Email: info@autoupkeep.com Website: www.AutoUpkeep.com

Curriculum Resources

Textbook

Auto Upkeep is available in hardcover binding.

ISBN: 978-1-62702-050-3 (hardcover)

Workbook

Activities and study questions that correlate with the book's content can be accessed in the *Auto Upkeep Workbook*.

ISBN: 978-1-62702-051-0 (paperback)

eBook

Auto Upkeep eTextbook and *eWorkbook* options are available at **www.AutoUpkeep.com/ebooks**.

ISBN: 978-1-62702-055-8 (ebook set)

Instructor Guide

The *Auto Upkeep Instructor Guide* is a comprehensive resource that assists in delivering the curriculum.

ISBN: 978-1-62702-059-6 (paperback)

Instructor Resources

The *Auto Upkeep Instructor Resources* include online files that assist instructors in curriculum implementation. Instructors at educational institutions that have adopted the curriculum may obtain access at **Academy.AutoUpkeep.com** through an instructor course. Email **info@autoupkeep.com** to request access.

Additional Resources

Additional *Auto Upkeep* resources can be experienced online at **www.AutoUpkeep.com**.

Auto Upkeep Academy

Auto Upkeep Academy options are available at **Academy.AutoUpkeep.com**.

Videos

Links to videos that support content learned can be accessed at **www.Video.AutoUpkeep.com.**

ASE Education Foundation Correlations

The *Auto Upkeep* curriculum correlates to the entry level tasks within the 2024 ASE Education Foundation Maintenance and Light Repair (MLR) task list. A correlation matrix can be accessed in the instructor guide, workbook, and at **www.AutoUpkeep.com/standards**.

We Support ASE Education Foundation

Limited Photocopy Permission

Instructor Resources

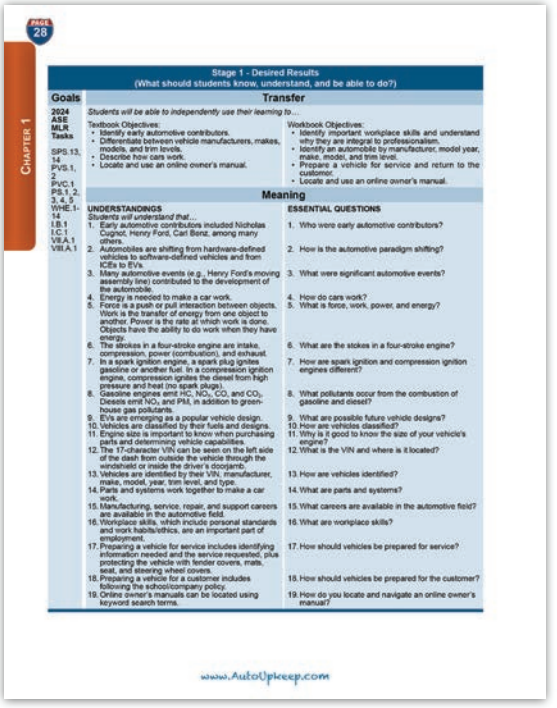
- Course Syllabus Outline
- ASE Correlation Matrix
- Activities
- Chapter Tests and Final
- Readability Worksheets
- Printable Certificates
- Competency Profile
- PowerPoint Slides
- Lesson Plans
- Answer Keys
- LMS Common Cartridge File
- Learning Extensions

ISBN: 978-1-62702-057-2 Includes Textbook, Workbook, Instructor Guide, and Online Access to Instructor Resources

Features of the Instructor Guide

Lesson Plans

Outline what should be taught and how learning will be assessed.



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CHAPTER 1

Stage 1 - Desired Results
(What should students know, understand, and be able to do?)

Goals

2024 ASE MLR Tasks

SPS.13, 14
PVS.1, 2
PVC.1
PS.1, 2, 3, 4, 5
WHE.1-14
I.B.1
I.C.1
VII.A.1
VIII.A.1

Transfer

Students will be able to independently use their learning to…

Textbook Objectives:
- Identify early automotive contributors.
- Differentiate between vehicle manufacturers, makes, models, and trim levels.
- Describe how cars work.
- Locate and use an online owner's manual.

Workbook Objectives:
- Identify important workplace skills and understand why they are integral to professionalism.
- Identify an automobile by manufacturer, model year, make, model, and trim level.
- Prepare a vehicle for service and return to the customer.
- Locate and use an online owner's manual.

Meaning

UNDERSTANDINGS *Students will understand that…*	ESSENTIAL QUESTIONS
1. Early automotive contributors included Nicholas Cugnot, Henry Ford, Carl Benz, among many others.	1. Who were early automotive contributors?
2. Automobiles are shifting from hardware-defined vehicles to software-defined vehicles and from ICEs to EVs.	2. How is the automotive paradigm shifting?
3. Many automotive events (e.g., Henry Ford's moving assembly line) contributed to the development of the automobile.	3. What were significant automotive events?
4. Energy is needed to make a car work.	4. How do cars work?
5. Force is a push or pull interaction between objects. Work is the transfer of energy from one object to another. Power is the rate at which work is done. Objects have the ability to do work when they have energy.	5. What is force, work, power, and energy?
6. The strokes in a four-stroke engine are intake, compression, power (combustion), and exhaust.	6. What are the stokes in a four-stroke engine?
7. In a spark ignition engine, a spark plug ignites gasoline or another fuel. In a compression ignition engine, compression ignites the diesel from high pressure and heat (no spark plugs).	7. How are spark ignition and compression ignition engines different?
8. Gasoline engines emit HC, NO_x, CO, and CO_2. Diesels emit NO_x and PM, in addition to green-house gas pollutants.	8. What pollutants occur from the combustion of gasoline and diesel?
9. EVs are emerging as a popular vehicle design.	9. What are possible future vehicle designs?
10. Vehicles are classified by their fuels and designs.	10. How are vehicles classified?
11. Engine size is important to know when purchasing parts and determining vehicle capabilities.	11. Why is it good to know the size of your vehicle's engine?
12. The 17-character VIN can be seen on the left side of the dash from outside the vehicle through the windshield or inside the driver's doorjamb.	12. What is the VIN and where is it located?
13. Vehicles are identified by their VIN, manufacturer, make, model, year, trim level, and type.	13. How are vehicles identified?
14. Parts and systems work together to make a car work.	14. What are parts and systems?
15. Manufacturing, service, repair, and support careers are available in the automotive field.	15. What careers are available in the automotive field?
16. Workplace skills, which include personal standards and work habits/ethics, are an important part of employment.	16. What are workplace skills?
17. Preparing a vehicle for service includes identifying information needed and the service requested, plus protecting the vehicle with fender covers, mats, seat, and steering wheel covers.	17. How should vehicles be prepared for service?
18. Preparing a vehicle for a customer includes following the school/company policy.	18. How should vehicles be prepared for the customer?
19. Online owner's manuals can be located using keyword search terms.	19. How do you locate and navigate an online owner's manual?

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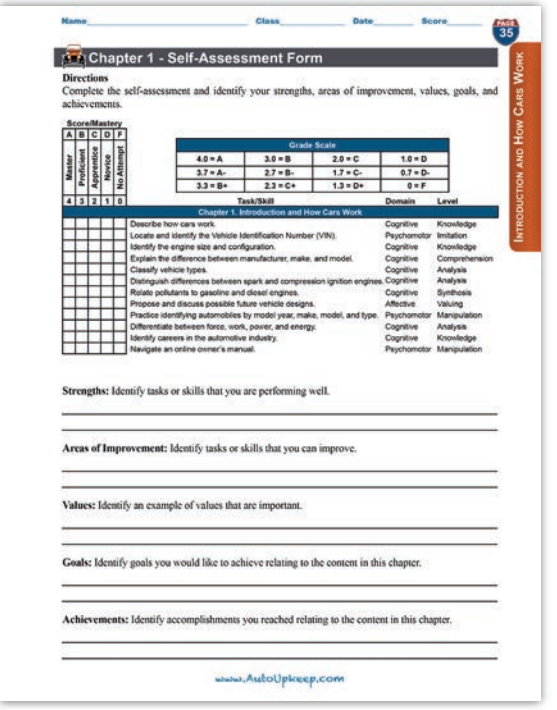
Self-Assessment Forms

Assess strengths, weaknesses, and areas for further study.



Name_____ Class_____ Date_____ Score_____

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INTRODUCTION AND HOW CARS WORK

Chapter 1 - Self-Assessment Form

Directions
Complete the self-assessment and identify your strengths, areas of improvement, values, goals, and achievements.

Score/Mastery

A	B	C	D	F
Master	Professional	Apprentice	Novice	No Attempt
4	3	2	1	0

Grade Scale

4.0 = A	3.0 = B	2.0 = C	1.0 = D
3.7 = A-	2.7 = B-	1.7 = C-	0.7 = D-
3.3 = B+	2.3 = C+	1.3 = D+	0 = F

Task/Skill	Domain	Level
Chapter 1. Introduction and How Cars Work		
Describe how cars work.	Cognitive	Knowledge
Locate and identify the Vehicle Identification Number (VIN).	Psychomotor	Imitation
Identify the engine size and configuration.	Cognitive	Knowledge
Explain the difference between manufacturer, make, and model.	Cognitive	Comprehension
Classify vehicle types.	Cognitive	Analysis
Distinguish differences between spark and compression ignition engines.	Cognitive	Analysis
Relate pollutants to gasoline and diesel engines.	Cognitive	Synthesis
Propose and discuss possible future vehicle designs.	Affective	Valuing
Practice identifying automobiles by model year, make, model, and type.	Psychomotor	Manipulation
Differentiate between force, work, power, and energy.	Cognitive	Analysis
Identify careers in the automotive industry.	Cognitive	Knowledge
Navigate an online owner's manual.	Psychomotor	Manipulation

Strengths: Identify tasks or skills that you are performing well.

Areas of Improvement: Identify tasks or skills that you can improve.

Values: Identify an example of values that are important.

Goals: Identify goals you would like to achieve relating to the content in this chapter.

Achievements: Identify accomplishments you reached relating to the content in this chapter.

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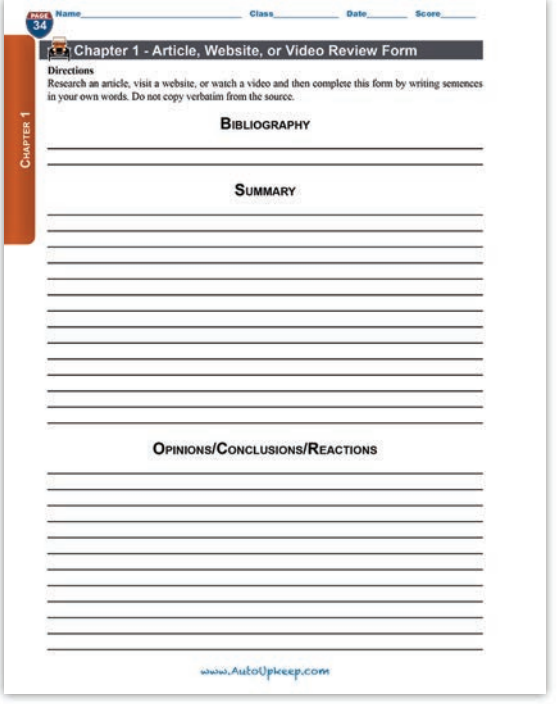
Article, Website, or Video Review Forms

Extend learning through different learning styles.



Name_____ Class_____ Date_____ Score_____

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CHAPTER 1

Chapter 1 - Article, Website, or Video Review Form

Directions
Research an article, visit a website, or watch a video and then complete this form by writing sentences in your own words. Do not copy verbatim from the source.

Bibliography

Summary

Opinions/Conclusions/Reactions

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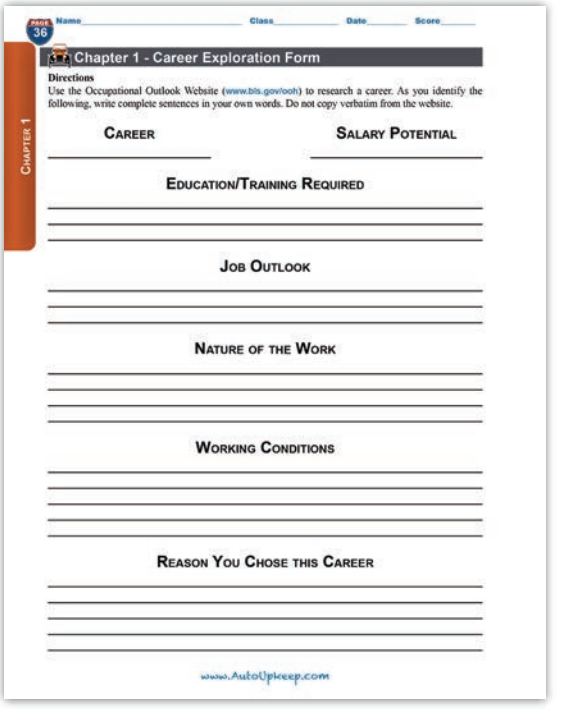
Career Exploration Forms

Encourage career research, identification, and exploration.



Name_____ Class_____ Date_____ Score_____

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CHAPTER 1

Chapter 1 - Career Exploration Form

Directions
Use the Occupational Outlook Website (www.bls.gov/ooh) to research a career. As you identify the following, write complete sentences in your own words. Do not copy verbatim from the website.

Career **Salary Potential**

Education/Training Required

Job Outlook

Nature of the Work

Working Conditions

Reason You Chose this Career

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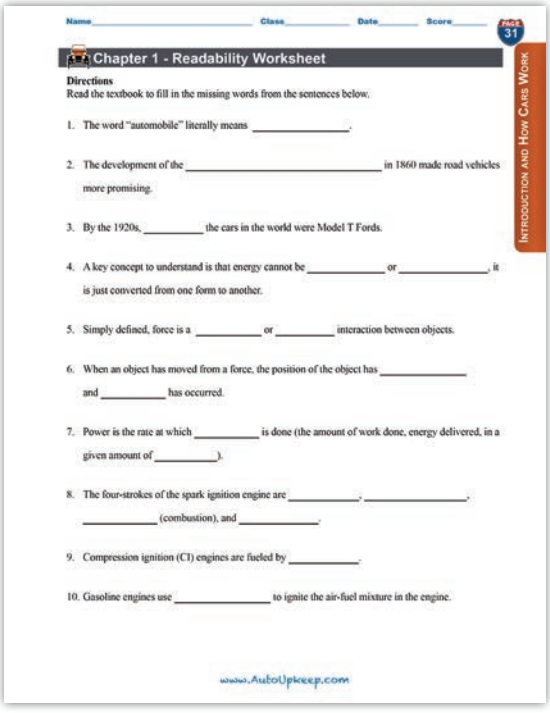
READABILITY WORKSHEETS

Reinforce and assess understanding of each chapter.



Name_____ Class_____ Date_____ Score_____ PAGE 31

Chapter 1 - Readability Worksheet

INTRODUCTION AND HOW CARS WORK

Directions
Read the textbook to fill in the missing words from the sentences below.

1. The word "automobile" literally means _____.
2. The development of the _____ in 1860 made road vehicles more promising.
3. By the 1920s, _____ the cars in the world were Model T Fords.
4. A key concept to understand is that energy cannot be _____ or _____; it is just converted from one form to another.
5. Simply defined, force is a _____ or _____ interaction between objects.
6. When an object has moved from a force, the position of the object has _____ and _____ has occurred.
7. Power is the rate at which _____ is done (the amount of work done, energy delivered, in a given amount of _____).
8. The four-strokes of the spark ignition engine are _____, _____, _____ (combustion), and _____.
9. Compression ignition (CI) engines are fueled by _____.
10. Gasoline engines use _____ to ignite the air-fuel mixture in the engine.

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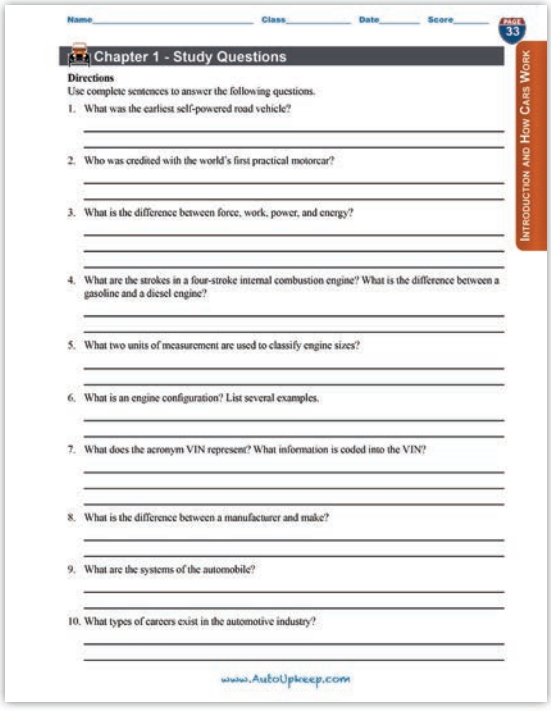
STUDY QUESTIONS

Promote reflection and understanding of each chapter.



Name_____ Class_____ Date_____ Score_____ PAGE 33

Chapter 1 - Study Questions

INTRODUCTION AND HOW CARS WORK

Directions
Use complete sentences to answer the following questions.

1. What was the earliest self-powered road vehicle?
2. Who was credited with the world's first practical motorcar?
3. What is the difference between force, work, power, and energy?
4. What are the strokes in a four-stroke internal combustion engine? What is the difference between a gasoline and a diesel engine?
5. What two units of measurement are used to classify engine sizes?
6. What is an engine configuration? List several examples.
7. What does the acronym VIN represent? What information is coded into the VIN?
8. What is the difference between a manufacturer and make?
9. What are the systems of the automobile?
10. What types of careers exist in the automotive industry?

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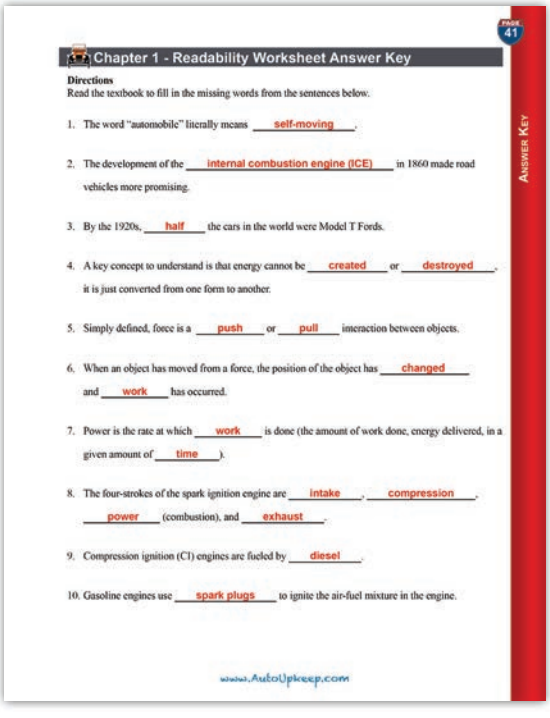
READABILITY WORKSHEETS ANSWER KEYS

Provide answers in red.



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Chapter 1 - Readability Worksheet Answer Key

ANSWER KEY

Directions
Read the textbook to fill in the missing words from the sentences below.

1. The word "automobile" literally means ___self-moving___.
2. The development of the ___internal combustion engine (ICE)___ in 1860 made road vehicles more promising.
3. By the 1920s, ___half___ the cars in the world were Model T Fords.
4. A key concept to understand is that energy cannot be ___created___ or ___destroyed___; it is just converted from one form to another.
5. Simply defined, force is a ___push___ or ___pull___ interaction between objects.
6. When an object has moved from a force, the position of the object has ___changed___ and ___work___ has occurred.
7. Power is the rate at which ___work___ is done (the amount of work done, energy delivered, in a given amount of ___time___).
8. The four-strokes of the spark ignition engine are ___intake___, ___compression___, ___power___ (combustion), and ___exhaust___.
9. Compression ignition (CI) engines are fueled by ___diesel___.
10. Gasoline engines use ___spark plugs___ to ignite the air-fuel mixture in the engine.

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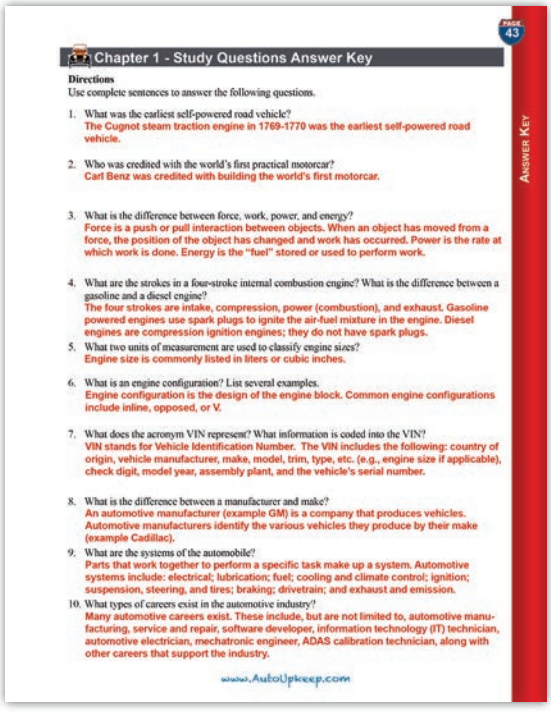
STUDY QUESTIONS ANSWER KEYS

Provide answers in red.



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Chapter 1 - Study Questions Answer Key

ANSWER KEY

Directions
Use complete sentences to answer the following questions.

1. What was the earliest self-powered road vehicle?
   The Cugnot steam traction engine in 1769-1770 was the earliest self-powered road vehicle.
2. Who was credited with the world's first practical motorcar?
   Carl Benz was credited with building the world's first motorcar.
3. What is the difference between force, work, power, and energy?
   Force is a push or pull interaction between objects. When an object has moved from a force, the position of the object has changed and work has occurred. Power is the rate at which work is done. Energy is the "fuel" stored or used to perform work.
4. What are the strokes in a four-stroke internal combustion engine? What is the difference between a gasoline and a diesel engine?
   The four strokes are intake, compression, power (combustion), and exhaust. Gasoline powered engines use spark plugs to ignite the air-fuel mixture in the engine. Diesel engines are compression ignition engines; they do not have spark plugs.
5. What two units of measurement are used to classify engine sizes?
   Engine size is commonly listed in liters or cubic inches.
6. What is an engine configuration? List several examples.
   Engine configuration is the design of the engine block. Common engine configurations include inline, opposed, or V.
7. What does the acronym VIN represent? What information is coded into the VIN?
   VIN stands for Vehicle Identification Number. The VIN includes the following: country of origin, vehicle manufacturer, make, model, trim, type, etc. (e.g., engine size if applicable), check digit, model year, assembly plant, and the vehicle's serial number.
8. What is the difference between a manufacturer and make?
   An automotive manufacturer (example GM) is a company that produces vehicles. Automotive manufacturers identify the various vehicles they produce by their make (example Cadillac).
9. What are the systems of the automobile?
   Parts that work together to perform a specific task make up a system. Automotive systems include: electrical; lubrication; fuel; cooling and climate control; ignition; suspension, steering, and tires; braking; drivetrain; and exhaust and emission.
10. What types of careers exist in the automotive industry?
    Many automotive careers exist. These include, but are not limited to, automotive manufacturing, service and repair, software developer, information technology (IT) technician, automotive electrician, mechatronic engineer, ADAS calibration technician, along with other careers that support the industry.

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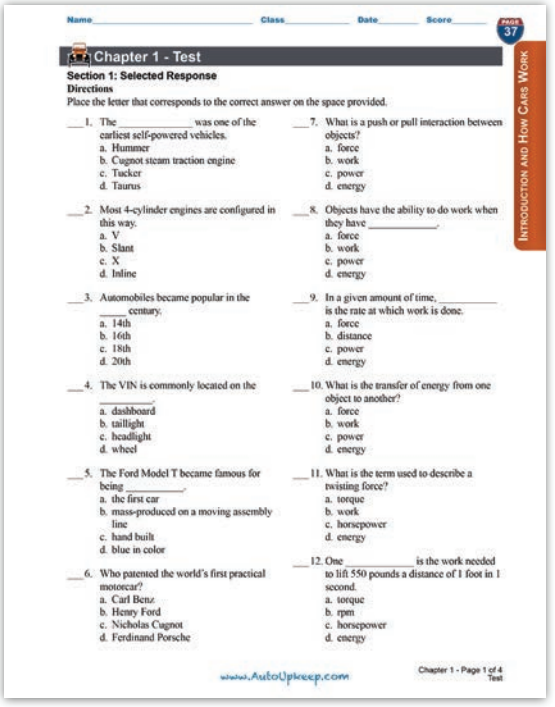
TESTS

Evaluate knowledge, skills, and abilities.



Name_____ Class_____ Date_____ Score_____ PAGE 37

Chapter 1 - Test

Section 1: Selected Response

Directions

Place the letter that corresponds to the correct answer on the space provided.

___1. The _____ was one of the earliest self-powered vehicles.
a. Hummer
b. Cugnot steam traction engine
c. Tucker
d. Taurus

___2. Most 4-cylinder engines are configured in this way.
a. V
b. Slant
c. X
d. Inline

___3. Automobiles became popular in the _____ century.
a. 14th
b. 16th
c. 18th
d. 20th

___4. The VIN is commonly located on the _____.
a. dashboard
b. taillight
c. headlight
d. wheel

___5. The Ford Model T became famous for being _____.
a. the first car
b. mass-produced on a moving assembly line
c. hand built
d. blue in color

___6. Who patented the world's first practical motorcar?
a. Carl Benz
b. Henry Ford
c. Nicholas Cugnot
d. Ferdinand Porsche

___7. What is a push or pull interaction between objects?
a. force
b. work
c. power
d. energy

___8. Objects have the ability to do work when they have _____.
a. force
b. work
c. power
d. energy

___9. In a given amount of time, _____ is the rate at which work is done.
a. force
b. distance
c. power
d. energy

___10. What is the transfer of energy from one object to another?
a. force
b. work
c. power
d. energy

___11. What is the term used to describe a twisting force?
a. torque
b. work
c. horsepower
d. energy

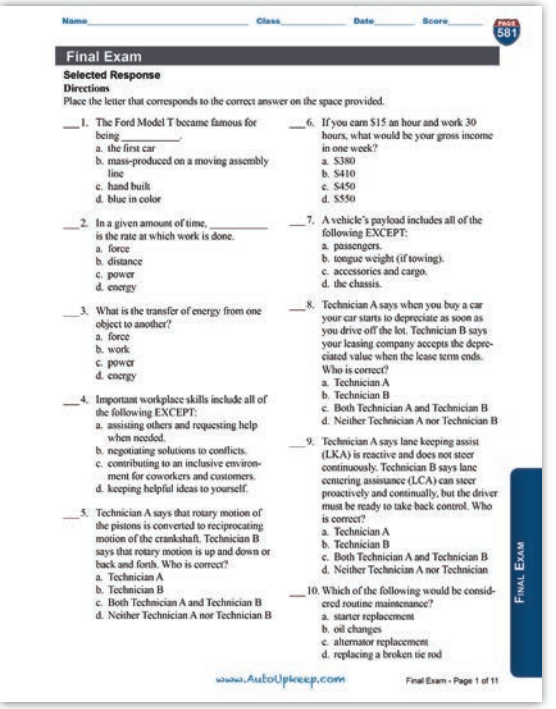
___12. One _____ is the work needed to lift 550 pounds a distance of 1 foot in 1 second.
a. torque
b. rpm
c. horsepower
d. energy

INTRODUCTION AND HOW CARS WORK

www.AutoUpkeep.com Chapter 1 - Page 1 of 4 Test

FINAL EXAM

Evaluates overall knowledge, skills, and abilities.



Name_____ Class_____ Date_____ Score_____ PAGE 581

Final Exam

Selected Response

Directions

Place the letter that corresponds to the correct answer on the space provided.

___1. The Ford Model T became famous for being _____.
a. the first car
b. mass-produced on a moving assembly line
c. hand built
d. blue in color

___2. In a given amount of time, _____ is the rate at which work is done.
a. force
b. distance
c. power
d. energy

___3. What is the transfer of energy from one object to another?
a. force
b. work
c. power
d. energy

___4. Important workplace skills include all of the following EXCEPT:
a. assisting others and requesting help when needed.
b. negotiating solutions to conflicts.
c. contributing to an inclusive environment for coworkers and customers.
d. keeping helpful ideas to yourself.

___5. Technician A says that rotary motion of the pistons is converted to reciprocating motion of the crankshaft. Technician B says that rotary motion is up and down or back and forth. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

___6. If you earn $15 an hour and work 30 hours, what would be your gross income in one week?
a. $380
b. $410
c. $450
d. $550

___7. A vehicle's payload includes all of the following EXCEPT:
a. passengers.
b. tongue weight (if towing).
c. accessories and cargo.
d. the chassis.

___8. Technician A says when you buy a car your car starts to depreciate as soon as you drive off the lot. Technician B says your leasing company accepts the depreciated value when the lease term ends. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

___9. Technician A says lane keeping assist (LKA) is reactive and does not steer continuously. Technician B says lane centering assistance (LCA) can steer proactively and continually, but the driver must be ready to take back control. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician

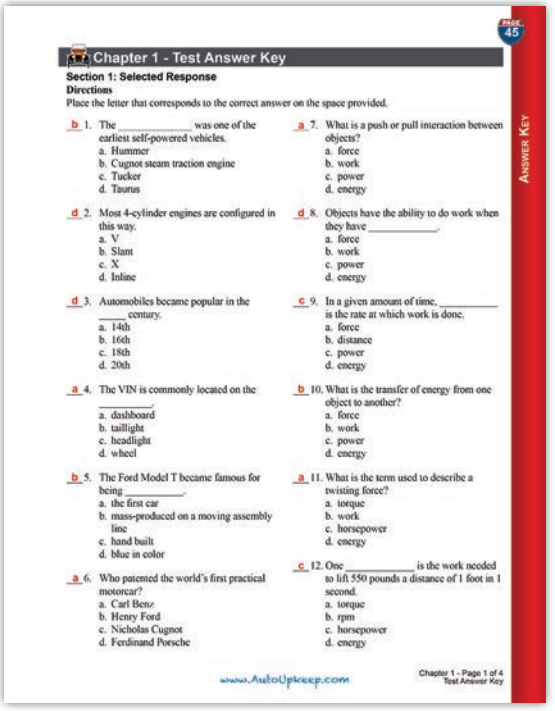
___10. Which of the following would be considered routine maintenance?
a. starter replacement
b. oil changes
c. alternator replacement
d. replacing a broken tie rod

FINAL EXAM

www.AutoUpkeep.com Final Exam - Page 1 of 11

TESTS ANSWER KEYS

Provide answers in red.



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Chapter 1 - Test Answer Key

Section 1: Selected Response

Directions

Place the letter that corresponds to the correct answer on the space provided.

b 1. The _____ was one of the earliest self-powered vehicles.
a. Hummer
b. Cugnot steam traction engine
c. Tucker
d. Taurus

d 2. Most 4-cylinder engines are configured in this way.
a. V
b. Slant
c. X
d. Inline

d 3. Automobiles became popular in the _____ century.
a. 14th
b. 16th
c. 18th
d. 20th

a 4. The VIN is commonly located on the _____.
a. dashboard
b. taillight
c. headlight
d. wheel

b 5. The Ford Model T became famous for being _____.
a. the first car
b. mass-produced on a moving assembly line
c. hand built
d. blue in color

a 6. Who patented the world's first practical motorcar?
a. Carl Benz
b. Henry Ford
c. Nicholas Cugnot
d. Ferdinand Porsche

a 7. What is a push or pull interaction between objects?
a. force
b. work
c. power
d. energy

d 8. Objects have the ability to do work when they have _____.
a. force
b. work
c. power
d. energy

c 9. In a given amount of time, _____ is the rate at which work is done.
a. force
b. distance
c. power
d. energy

b 10. What is the transfer of energy from one object to another?
a. force
b. work
c. power
d. energy

a 11. What is the term used to describe a twisting force?
a. torque
b. work
c. horsepower
d. energy

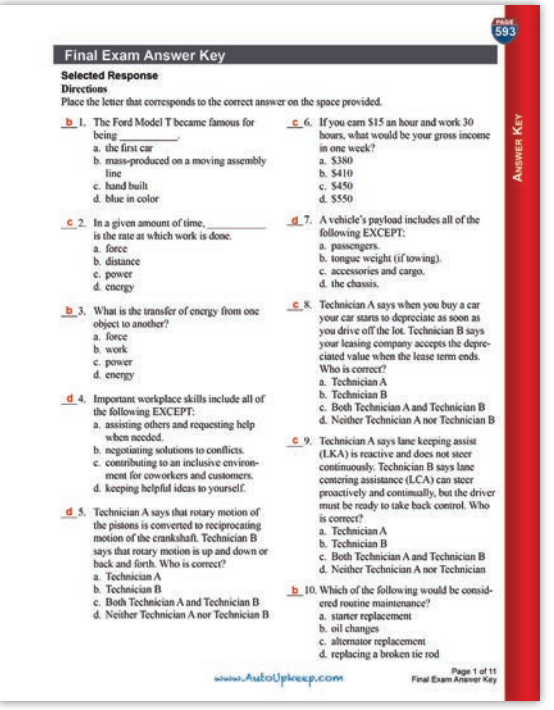
c 12. One _____ is the work needed to lift 550 pounds a distance of 1 foot in 1 second.
a. torque
b. rpm
c. horsepower
d. energy

ANSWER KEY

www.AutoUpkeep.com Chapter 1 - Page 1 of 4 Test Answer Key

FINAL EXAM ANSWER KEY

Provides answers in red.



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Final Exam Answer Key

Selected Response

Directions

Place the letter that corresponds to the correct answer on the space provided.

b 1. The Ford Model T became famous for being _____.
a. the first car
b. mass-produced on a moving assembly line
c. hand built
d. blue in color

c 2. In a given amount of time, _____ is the rate at which work is done.
a. force
b. distance
c. power
d. energy

b 3. What is the transfer of energy from one object to another?
a. force
b. work
c. power
d. energy

d 4. Important workplace skills include all of the following EXCEPT:
a. assisting others and requesting help when needed.
b. negotiating solutions to conflicts.
c. contributing to an inclusive environment for coworkers and customers.
d. keeping helpful ideas to yourself.

d 5. Technician A says that rotary motion of the pistons is converted to reciprocating motion of the crankshaft. Technician B says that rotary motion is up and down or back and forth. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

c 6. If you earn $15 an hour and work 30 hours, what would be your gross income in one week?
a. $380
b. $410
c. $450
d. $550

d 7. A vehicle's payload includes all of the following EXCEPT:
a. passengers.
b. tongue weight (if towing).
c. accessories and cargo.
d. the chassis.

c 8. Technician A says when you buy a car your car starts to depreciate as soon as you drive off the lot. Technician B says your leasing company accepts the depreciated value when the lease term ends. Who is correct?
a. Technician A
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c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

c 9. Technician A says lane keeping assist (LKA) is reactive and does not steer continuously. Technician B says lane centering assistance (LCA) can steer proactively and continually, but the driver must be ready to take back control. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician

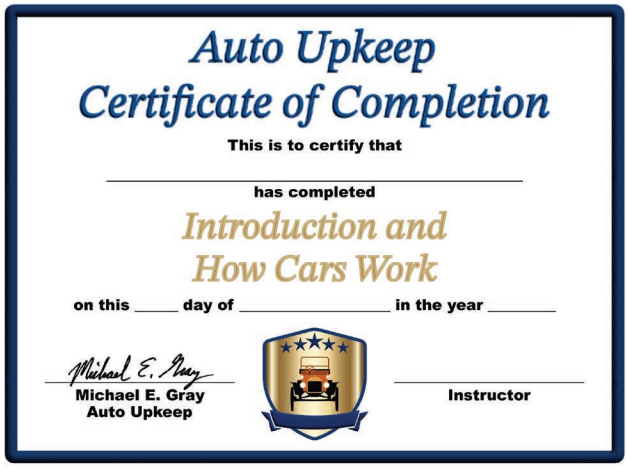
b 10. Which of the following would be considered routine maintenance?
a. starter replacement
b. oil changes
c. alternator replacement
d. replacing a broken tie rod

ANSWER KEY

www.AutoUpkeep.com Page 1 of 11 Final Exam Answer Key

Certificates of Completion (Chapter Specific)

Award chapter completion.



Certificate of Completion (All Chapters)

Awards course completion.

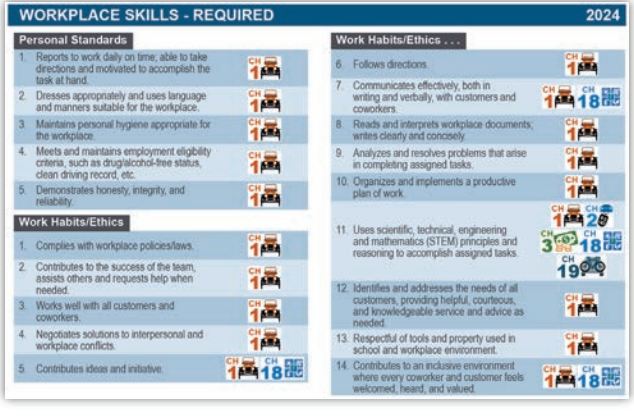
Appendix

Provides resources to enhance learning.

- Safety Rules
- Activity Completion Record
- Domains of Learning
- Competency Profile/Task List
- Daily Reflection Log
- Article, Website, or Video Review Form
- Career Exploration Form
- Work Order/Repair Invoice
- Vehicle Walk-Around Inspection Form
- Multi-Point Vehicle Inspection Form
- Sample Lesson Plan
- Rubrics
- Tools and Supplies List

ASE Maintenance and Light Repair (MLR) Tasks

Identify ASE Education Foundation and *Auto Upkeep* task correlations.



Edge Index - Chapters are color coded and organized with an edge index to help you navigate the following:

- **Foundational (Top)** -These chapters will give students a solid automotive foundation to build upon.
- **Consumer and Advanced Technology (Middle)** - These chapters will help students become more informed automotive consumers and expand awareness of advancing electric and next-generation technologies.
- **Automotive Systems (Bottom)** - These chapters will help students understand how the systems of the automobile work together.

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CHAPTER 7

Auto Care and Cleaning

CHAPTER 8

Fluid Level Check

CHAPTER 9

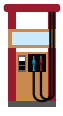
Electrical System

CHAPTER 10

Lubrication System

CHAPTER 11

Fuel System



CHAPTER 12

Cooling System and Climate Control

CHAPTER 13

Ignition System

CHAPTER 14

Suspension, Steering, and Tires

CHAPTER 15

Braking System

CHAPTER 16

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CHAPTER 17

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CHAPTER 18

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CHAPTER 19

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CHAPTER 20

Common Problems and Roadside Emergencies

CHAPTER 21

Electric Vehicles

CHAPTER 22

Next-Generation Vehicles

FINAL EXAM

Course Syllabus Example

Course Description

Auto Upkeep is an introductory automotive course that focuses on what all car owners and entry level technicians should know and be able to do. This course focuses on the fundamental knowledge and experience in owning and maintaining an automobile. Students will discover how to choose a quality repair facility, buy a car, choose an insurance policy, handle roadside emergencies, diagnose common problems, and communicate effectively with technicians. Students will learn about safety, tools, automotive systems, and how to complete basic maintenance and repairs. For individuals that want to pursue Automotive Technology as a career, *Auto Upkeep* provides a solid foundation critical to maintenance, light repair, auto ownership, and how cars work. This course provides students with the knowledge to make economical decisions and take preventative measures to enhance the overall satisfaction of being an automotive consumer. The class discussions and activities provide the fundamental knowledge and experience in owning and maintaining an automobile.

Course Goal

This course is designed to provide students with the necessary environment and interactions to advance their knowledge and understanding in owning, maintaining, and repairing the automobile.

Learning Outcomes (Objectives/Competencies/Tasks)

See the *Auto Upkeep Competency Profile/Task List* on page 610 of this book.
See the *ASE Maintenance and Light Repair (MLR) Tasks* on page 633 of this book.

Career and Technical Education (CTE) Career Cluster

Transportation, Distribution, and Logistics (old)
Supply Chain and Transportation (new)

Recommended Ages

15 Years and Up

Standards Correlations

The *Auto Upkeep* curriculum correlates to the following standards.

ASE Education Foundation	Texas Essential Knowledge and Skills (TEKS)
Auto Upkeep correlates to the *2024 ASE Maintenance and Light Repair (MLR)* entry level tasks, making it an ideal first course in becoming an Automotive Technician.	*Auto Upkeep* correlates to 100% of TEKS for the Texas course titled Automotive Basics. TEKS are the state standards for what students should know and be able to do.

Safety

It is essential that each student follows all safety guidelines, rules, and procedures as discussed in class and demonstrated in the lab/shop. Personal Protection Equipment (PPE) is required during hands-on activities. Safety glasses are required for all hands-on activities. Ear protection is required when the work area exceeds 85 decibels. Hand protection is required when hazards exist. See the following OSHA regulations. ***Note: This is a partial list. Follow all Occupational Safety and Health Administration (OSHA) regulations and specific school policies.***

Title	Regulation
Eye and Face Protection 1910.133 (a)(1)	The employer shall ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.
Occupational Noise Exposure 1910.95(i)(1)	Employers shall make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors shall be replaced as necessary.
Hand and Body Protection 1915.157 (a)	The employer shall ensure that each affected employee uses appropriate hand protection and other protective clothing where there is exposure to hazards such as skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns, harmful temperature extremes, and sharp objects.

TEXTBOOK AND WORKBOOK

Gray, M.E., & Gray, L.E. (2025). *Auto Upkeep: Maintenance, Light Repair, Auto Ownership, Advanced Driver Assistance Systems (ADAS), and Next-Generation Vehicles (Including: Autonomous, Connected, Electrified, and Software-Defined)* (5th Edition). Ozark, MO: Rolling Hills Publishing, LLC.

ISBN: 978-1-62702-050-3
Hardcover Textbook

ISBN: 978-1-62702-051-0
Paperback Workbook

ISBN: 978-1-62702-055-8
eTextbook and eWorkbook Set

Available at **www.AutoUpkeep.com**

CREDITS/UNITS

Auto Upkeep is usually a 1 credit course elective in a high school. If *Auto Upkeep* is a ½ credit course, then the number of activities is reduced. At the college level, *Auto Upkeep* is usually a 3 to 4 credit course. *Auto Upkeep* is commonly the first course in a Maintenance and Light Repair (MLR) program.

High School

Credits or Units	Academic Calendar Length	Weeks	Days	Class Length 1 Period = 45 Minutes 1 Block = 90 Minutes	Total Minutes	Total Minutes/ 60 Minutes = Total Hours
0.5	Quarter	9 Weeks	45 Days	90 Minutes	4,050 Minutes	67.5 Hours
0.5	Semester	18 Weeks	90 Days	45 Minutes	4,050 Minutes	67.5 Hours
1	**Semester**	**18 Weeks**	**90 Days**	**90 Minutes**	**8,100 Minutes**	**135 Hours**
1	School Year	36 Weeks	180 Days	45 Minutes	8,100 Minutes	135 Hours

Note: Row in bold represents the most common way that Auto Upkeep is organized at a high school.

College/University

Credits or Units	Weeks	Lecture Hours per Week	Lab Hours per Week	Student Study Time per Week (Outside of Class)	Total Hours
1	15 Weeks	1 Hour	None	2 Hours	45 Hours
2	15 Weeks	1 Hour	1 Hour	2 Hours	60 Hours
3	15 Weeks	2.0 Hours	1 Hour	4 Hours	105 Hours
4	**15 Weeks**	**2.5 Hours**	**1.5 Hours**	**5 Hours**	**135 Hours**

Note: Row in bold represents the most common way that Auto Upkeep is organized at a college/university.

Content Delivery Method

Auto Upkeep includes active participation, workplace skills, Internet-based activities, and hands-on activities. Active participation involves asking questions, sharing ideas, engaging in discussions, analyzing information, forming opinions, listening to lectures, and collaborating with others. Workplace skills include personal standards and work habits/ethics. Internet-based activities focus on researching specific tasks or information. Hands-on activities include completing designated procedures that involve inspection, replacement, and identification of automotive components. During hands-on activities students apply knowledge to further advance their understanding of the automobile. Most hands-on activities can be completed with a limited number of tools. Some activities can also be completed more than once to extend hours of instruction.

Attendance

School policy on absences and tardiness will be followed.

Requirements

Students will be required to complete hands-on and Internet-based activities, participate in class discussions, take notes during lectures, and complete research as assigned.

Plagiarism

Students must submit their own work. No Artificial Intelligence (AI) generated research will be accepted.

Example Course Names

Below are common names for an introductory automotive course.

Example Course Names
Auto 1
Auto 101
Auto Basics
Auto Service
Auto Shop 1
Auto Survival
Auto Upkeep
Automotive Basics
Automotive Fundamentals
Automotive Preventative Maintenance
Automotive Service Technology
Automotive Studies
Automotive Systems
Automotive Technology 1
Basic Car Care
Basic Mechanics
Beginning Auto
Beginning Automotive and Maintenance
Car Care
Car Upkeep
Car Wise
Consumer Auto
General Automotive Maintenance
General Service Technician
Introduction to Mechanics
Introduction to Auto Repair
Introduction to Automotive Systems
Maintenance and Light Repair (MLR)
Mechanical Tech 1
Power Mechanics
Principles of Automotive
Principles of Transportation
Transportation Technology
Vehicle Service and Repair

GRADING POLICY

Grading policy is designated by the institution or instructor. Grade distribution is determined by activities, assignments, and assessments. Activities, assignments, and assessments within each grading category can be recorded in a gradebook as a Percent Grade, Letter Grade, or on a 4-Point Scale.

GRADING SCALES

Grade scales are defined by the institution or instructor. The following are examples.

Grade Scales - Condensed

Percent Grade	Letter Grade	4-Point Scale
93-100	A	4.0
90-92	A-	3.7
87-89	B+	3.3
83-86	B	3.0
80-82	B-	2.7
77-79	C+	2.3
73-76	C	2.0
70-72	C-	1.7
67-69	D+	1.3
63-66	D	1.0
60-62	D-	0.7
0-59	F	0.0

Grade Scales - Expanded

Percent Grade	Letter Grade	4-Point Scale
98-100	A	4.0
95-97	A	3.9
93-94	A	3.8
92	A-	3.7
91	A-	3.6
90	A-	3.5
89	B+	3.4
88	B+	3.3
87	B+	3.2
86	B	3.1
85	B	3.0
84	B	2.9
83	B	2.8
82	B-	2.7
81	B-	2.6
80	B-	2.5
79	C+	2.4
78	C+	2.3
77	C+	2.2
76	C	2.1
75	C	2.0
74	C	1.9
73	C	1.8
72	C-	1.7
71	C-	1.6
70	C-	1.5
69	D+	1.4
68	D+	1.3
67	D+	1.2
66	D	1.1
65	D	1.0
64	D	0.9
63	D	0.8
62	D-	0.7
61	D-	0.6
60	D-	0.5
0-59	F	0.0

Grading an Assignment

To calculate a Percent Grade, take the number of correct questions and divide it by the total number of questions. Then multiply by 100. For example, if you had an assignment with 20 questions and each question was assigned 1 point, then the following could be used to assign a grade.

Grading an Assignment

Number Correct	Percent Grade	Letter Grade	4-Point Scale
20	(20/20) x 100 = 100	A	4.0
19	(19/20) x 100 = 95	A	3.9
18	(18/20) x 100 = 90	A-	3.5
17	(17/20) x 100 = 85	B	3.0
16	(16/20) x 100 = 80	B-	2.5
15	(15/20) x 100 = 75	C	2.0
14	(14/20) x 100 = 70	C-	1.5
13	(13/20) x 100 = 65	D	1.0
12	(12/20) x 100 = 60	D-	0.5
11	(11/20) x 100 = 55	F	0.0
10	(10/20) x 100 = 50	F	0.0
9	(9/20) x 100 = 45	F	0.0
8	(8/20) x 100 = 40	F	0.0
7	(7/20) x 100 = 35	F	0.0
6	(6/20) x 100 = 30	F	0.0
5	(5/20) x 100 = 25	F	0.0
4	(4/20) x 100 = 20	F	0.0
3	(3/20) x 100 = 15	F	0.0
2	(2/20) x 100 = 10	F	0.0
1	(1/20) x 100 = 5	F	0.0
0	(0/20) x 100 = 0	F	0.0

Grading Categories and Weights

Activities, assignments, and assessments are placed into Grading Categories. Each Grading Category should be given a weight. The Total Weight should equal 100%.

Grading Categories and Weights

Grading Categories (Activities, Assignments, and Assessments)	Weight
Readability Worksheets	5%
Daily Reflection Logs	5%
Article, Website, and Video Reviews	5%
Study Questions	5%
Activities	20%
Self-Assessment Forms	5%
Career Explorations	5%
Active Participation	10%
Workplace Skills	10%
Chapter Tests	10%
Final Exam	10%
Competency Profile	10%
Total Weight	**100%**

CALCULATING A WEIGHTED GRADE

To calculate a weighted grade:

1. Identify each category weight.

Example

Grading Categories (Activities, Assignments, and Assessments)	Weight
Chapter Tests	10%

2. Calculate each category average grade.

Example

Chapter Tests	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Average Grade
Score	95	80	75	75	95	75	65	80	95	60	75	85	95	80	70	65	80	90	85	75	80	85	80

Add the scores and divide by the number of items entered.
1760/22 = 80
Average Grade for the Chapter Tests = 80

3. Multiple the category average grade by weight.

Example

80 x 0.10 = 8.00
This is the category weighted grade.

4. Add all category weighted grades.

Example

Grading Categories (Activities, Assignments, and Assessments)	Category Average Grade	Category Weight	Category Weighted Grade
Readability Worksheets	90.6	5%	4.53
Daily Reflection Logs	85.2	5%	4.26
Article, Website, and Video Reviews	83.4	5%	4.17
Study Questions	87.4	5%	4.37
Activities	82.5	20%	16.50
Self-Assessment Forms	76.8	5%	3.84
Career Explorations	85.8	5%	4.29
Active Participation	75.8	10%	7.58
Workplace Skills	85.2	10%	8.52
Chapter Tests	80.0	10%	8.00
Final Exam	82.0	10%	8.20
Competency Profile	92.5	10%	9.25
Total		**100%**	**83.51**

5. Convert the total weighted grade to a course letter grade.

Example

83.51 ≈ 84 = B or 2.9 on a 4-Point Scale

GRADING CATEGORIES EXPLAINED

In the Course Schedule, Scope, and Sequence, the following are listed.

Grading Categories (Activities, Assignments, and Assessments)	Purpose
Readability Worksheets	Reinforce and assess understanding of each chapter.
Daily Reflection Logs	Reflect on learning and develop writing skills.
Article, Website, and Video Reviews	Extend learning. Article, website, and video reviews help students with different learning styles. • **Articles** from current automotive journals or magazines encourage understanding of new technologies or trends through reading and visual analysis of pictures, graphs, and illustrations. • **Websites** allow student reflection and expansion of learning through reading and visual analysis of pictures, graphs, and illustrations. Auditory learners can install a "Read Aloud" browser extension to have webpages read to them. **www.AutoUpkeep.com/resources** • **Videos** support visual learners, helping them understand new technologies, the latest trends, and maintenance and repair procedures. **www.Video.AutoUpkeep.com**
Study Questions	Promote reflection and understanding of each chapter.
Activities	Apply learning through hands-on and Internet-based activities.
Self-Assessment Forms	Assess strengths, weaknesses, and areas for further study.
Career Explorations	Encourage career research, identification, and exploration.
Active Participation	Encourages preparedness, critical thinking, collaboration, contributing, listening, following directions, and applying knowledge and skills.
Workplace Skills	Emphasize personal standards and work habits/ethics.
Chapter Tests	Evaluate knowledge, skills, and abilities.
Final Exam	Evaluates overall knowledge, skills, and abilities.
Competency Profile	Assesses mastery of specific tasks or skills.

Course Schedule, Scope, and Sequence

The following is based on an 18-week semester meeting for 1.5 hours per day.

18 weeks x 5 days a week x
1.5 hours per day = 135 hours

Auto Upkeep correlates to the 2024 ASE Maintenance and Light Repair (MLR) Tasks. The following abbreviations are used.

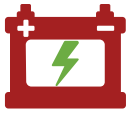
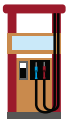
MLR Task Abbreviations	Content Areas
SPS	Shop and Personal Safety
xEV	xEV Vehicle Safety
TE	Tools and Equipment
PVS	Preparing for Vehicle Service
PVC	Preparing Vehicle for Customer
PS	Personal Standards
WHE	Work Habits/Ethics
I	Engine Repair – MLR
II	Automatic Transmission and Transaxle – MLR
III	Manual Drive Train and Axles – MLR
IV	Suspension and Steering – MLR
V	Brakes – MLR
VI	Electrical/Electronic Systems – MLR
VII	Heating, Ventilation, and Air Conditioning (HVAC) – MLR
VIII	Engine Performance – MLR

For a detailed list of all the ASE MLR Tasks, visit **aseeducationfoundation.org/resources** and click on *Program Standards* and then *Auto Program Standards – 2024*.

The ASE MLR Tasks are also found on page 633 of this book.

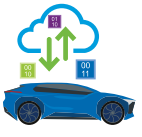
Week	Day	Topic	Task	Activities, Assignments, and Assessments (Check off when completed.)	2024 ASE MLR Tasks
Week 1	Day 1	Introduction Course Syllabus Tour of Area			
		CHAPTER 1 **Introduction and How Cars Work** 	Pages 10-15	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	SPS.13, 14 PVS.1, 2 PVC.1 PS.1, 2, 3, 4, 5 WHE.1-14 I.B.1 I.C.1 VII.A.1 VIII.A.1
	Day 2		Pages 16-25	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
	Day 3		Activities	❑ Complete Workplace Skills Activity ❑ Complete Car Identification and Preparing for Vehicle Service Activity ❑ Complete Owner's Manual Activity ❑ Complete Daily Reflection Log	
	Day 4		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
Week 2	Day 5		Pages 26-41	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	
	Day 6	**CHAPTER 2** **Buying an Automobile** 	Pages 42-51	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	WHE.11 I.A.1 II.A.1 III.A.1 IV.A.1 VI.A.1 VIII.A.1
	Day 7		Activities	❑ Complete Towing and Hauling Activity ❑ Complete Advanced Driver Assistance Systems (ADAS) Activity	
	Day 8		Activities	❑ Complete Buying a New Automobile Activity ❑ Complete Buying a Used Automobile Activity ❑ Complete Daily Reflection Log	
	Day 9		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 10	**CHAPTER 3** **Automotive Expenses** 	Pages 52-59	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
Week 3	Day 11		Activities	❑ Complete Automotive Expenses Activity ❑ Complete Daily Reflection Log	WHE.11
	Day 12		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 13	**CHAPTER 4** **Repair Facilities** 	Pages 60-67	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
	Day 14		Activities	❑ Complete Repair Facilities Activity ❑ Complete Daily Reflection Log	PVS.1-7
	Day 15		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	

Week	Day	Topic	Task	Activities, Assignments, and Assessments (Check off when completed.)	2024 ASE MLR Tasks
Week 4	Day 16	**CHAPTER 5** Safety Around the Automobile 	Pages 68-73	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	SPS.1, 3-13, 15
	Day 17		Pages 74-83	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
	Day 18		Activities	❑ Complete Automotive Safety Activity ❑ Complete Safety Data Sheet (SDS) Activity ❑ Complete PPE and Fire Safety Activity ❑ Complete Daily Reflection Log	
	Day 19		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 20	**CHAPTER 6** Tools, Fasteners, and Equipment 	Pages 84-95	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	SPS.2 TE.1-6 I.A.1 II.A.1 III.A.1 IV.A.1 V.A.1 VI.A.1 VIII.A.1
Week 5	Day 21		Pages 96-105	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
	Day 22		Activities	❑ Complete Tools and Equipment Activity ❑ Complete Daily Reflection Log	
	Day 23		Activities	❑ Complete Fasteners Activity ❑ Complete Service Manual Activity ❑ Complete Daily Reflection Log	
	Day 24		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 25	**CHAPTER 7** Auto Care and Cleaning 	Pages 106-115	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Answer Study Questions ❑ Complete Daily Reflection Log	PVS.2 PVC.1
Week 6	Day 26		Activities	❑ Complete Interior Cleaning Activity ❑ Complete Exterior Cleaning Activity ❑ Complete Waxing Activity ❑ Complete Daily Reflection Log	
	Day 27		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 28	**CHAPTER 8** Fluid Level Check 	Pages 116-125	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Answer Study Questions ❑ Complete Daily Reflection Log	I.A.1 I.A.4 I.D.1 I.D.3 I.D.5 II.A.1, 2, 4 II.B.2 III.A.1, 2, 4, 5 III.B.1 III.D-1.1, 2 IV.A.1 IV.B.2, 4 V.A.1 V.B.5 VI.A.1 VI.B.4 VIII.A.1
	Day 29		Activities	❑ Complete Fluid Level Check Activity ❑ Complete Daily Reflection Log	
	Day 30		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	

Week	Day	Topic	Task	Activities, Assignments, and Assessments (Check off when completed.)	2024 ASE MLR Tasks
Week 7	Day 31	CHAPTER 9 Electrical System 	Pages 126-135	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	SPS.14 I.D.5 VI.A.1, 2, 4-6, 9, 10, 13 VI.B.1-5, 7 VI.C.1-5 VI.D.1-4 VIII.B.1
	Day 32		Pages 136-145	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
	Day 33		Activities	❑ Complete Ohm's Law Activity ❑ Complete Circuit Construction Simulator Activity ❑ Complete Simple Circuits Activity ❑ Complete Voltage Drop Activity ❑ Complete Wiring Diagram Activity ❑ Complete Daily Reflection Log	
	Day 34		Activities	❑ Complete Battery Activity ❑ Complete Charging Activity ❑ Complete Starting Activity ❑ Complete Daily Reflection Log	
	Day 35		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
Week 8	Day 36	CHAPTER 10 Lubrication System 	Pages 146-155	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Answer Study Questions ❑ Complete Daily Reflection Log	I.A.1 I.D.1, 2
	Day 37		Activities	❑ Complete Oil and Filter Change Activity ❑ Complete Daily Reflection Log	
	Day 38		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 39	CHAPTER 11 Fuel System 	Pages 156-161	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	VI.A.1 VIII.A.1 VIII.D.1-3 VIII.E.1, 2
	Day 40		Pages 162-167	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
Week 9	Day 41		Activities	❑ Complete Fuel System Part ID Activity ❑ Complete Fuel System Maintenance Activity ❑ Complete Daily Reflection Log	
	Day 42		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	

Week	Day	Topic	Task	Activities, Assignments, and Assessments (Check off when completed.)	2024 ASE MLR Tasks
Week 9	Day 43	CHAPTER 12 Cooling System and Climate Control	Pages 168-175	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	I.D.1, 3, 4, 6-8 VII.A.1, 2, 4-8 VII.B.1-3 VII.C.1 VII.D.1, 2 VII.E.1 VIII.A.3
	Day 44		Pages 176-183	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
	Day 45		Activities	❑ Complete Air Conditioning Activity ❑ Complete Cabin Air Filter Activity ❑ Complete Daily Reflection Log	
Week 10	Day 46		Activities	❑ Complete Cooling System Activity ❑ Complete Daily Reflection Log	
	Day 47		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 48	CHAPTER 13 Ignition System	Pages 184-191	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Answer Study Questions ❑ Complete Daily Reflection Log	VIII.A.1 VIII.C.1, 2
	Day 49		Activities	❑ Complete Ignition System Activity ❑ Complete Daily Reflection Log	
	Day 50		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
Week 11	Day 51	CHAPTER 14 Suspension, Steering, and Tires	Pages 192-199	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	III.D-2.1 IV.A.1, 2 IV.B.1-9 IV.C.1-10 IV.D.1, 3 IV.E.3 IV.F.1-7 V.A.7 V.F.5
	Day 52		Pages 200-211	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
	Day 53		Activities	❑ Complete Suspension and Steering Activity ❑ Complete Daily Reflection Log	
	Day 54		Activities	❑ Complete Tire Inspection and Rotation Activity ❑ Complete Choosing the Right Tires Activity ❑ Complete Daily Reflection Log	
	Day 55		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
Week 12	Day 56	CHAPTER 15 Braking System	Pages 212-221	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Answer Study Questions ❑ Complete Daily Reflection Log	V.A.1, 2, 4-7 V.B.1-4, 6-8 V.D.1-6, 10 V.F.2-4 V.G.1, 2
	Day 57		Activities	❑ Complete Brake Inspection Activity ❑ Complete Daily Reflection Log	
	Day 58		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	

Week	Day	Topic	Task	Activities, Assignments, and Assessments (Check off when completed.)	2024 ASE MLR Tasks
Week 12	Day 59	**CHAPTER 16** Drivetrain 	Pages 222-231	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Answer Study Questions ❑ Complete Daily Reflection Log	II.A.1, 2, 4 II.C.1 III.A.1, 2, 4, 5 III.B.1 III.C.2 III.D-1.1, 2 III.E.2
	Day 60		Activities	❑ Complete Drivetrain Activity ❑ Complete Daily Reflection Log	
Week 13	Day 61		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 62	**CHAPTER 17** Exhaust and Emission System 	Pages 232-243	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Answer Study Questions ❑ Complete Daily Reflection Log	VIII.A.1 VIII.D.1, 4-6 VIII.E.1, 2
	Day 63		Activities	❑ Complete Exhaust and Emission Activity ❑ Complete Daily Reflection Log	
	Day 64		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 65	**CHAPTER 18** Alternative Fuels and Designs 	Pages 244-252	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	WHE.5, 7, 11, 14 I.A.8 II.C.2 VI.C.6
Week 14	Day 66		Pages 253-263	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
	Day 67		Activities	❑ Complete Payback Period Activity ❑ Complete Future Vehicle Activity ❑ Complete Daily Reflection Log	
	Day 68		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 69	**CHAPTER 19** Automotive Accessories 	Pages 264-270	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	WHE.11
	Day 70		Pages 271-279	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
Week 15	Day 71		Activities	❑ Complete Automotive Accessories Activity ❑ Complete Daily Reflection Log	
	Day 72		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	

Week	Day	Topic	Task	Activities, Assignments, and Assessments (Check off when completed.)	2024 ASE MLR Tasks
Week 15	Day 73	**CHAPTER 20** Common Problems and Roadside Emergencies 	Pages 280-291	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	SPS.3 I.A.2, 3 I.D.4 II.A.3 III.A.3 IV.A.1, 3 IV.F.1 V.A.3 VI.A.1-4, 7, 8, 11, 12 VI.B.6 VI.E.1 VI.F.1 VI.G.5 VII.A.3 VIII.A.1, 2
	Day 74		Pages 292-299	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
	Day 75		Activities	❑ Complete Changing a Flat Tire Activity ❑ Complete Jump-Starting Activity ❑ Complete Daily Reflection Log	
Week 16	Day 76		Activities	❑ Complete Lighting Activity ❑ Complete Replacing Wipers Activity ❑ Complete On-Board Diagnostics Activity ❑ Complete Daily Reflection Log	
	Day 77		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 78	**CHAPTER 21** Electric Vehicles 	Pages 300-311	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	xEV.1-6 VI.A.2 VI.H.1
	Day 79		Pages 312-325	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	
	Day 80		Pages 326-339	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
Week 17	Day 81		Activities	❑ Complete Electric Vehicles Activity ❑ Complete Daily Reflection Log	
	Day 82		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 83	**CHAPTER 22** Next-Generation Vehicles 	Pages 340-349	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	VI.G.1, 3
	Day 84		Pages 350-359	❑ Complete Readability Worksheet ❑ Complete Article, Website, or Video Review Form ❑ Complete Daily Reflection Log	
	Day 85		Pages 360-369	❑ Complete Readability Worksheet ❑ Answer Study Questions ❑ Complete Daily Reflection Log	
Week 18	Day 86		Activities	❑ Complete ADAS and Vehicle Automation Level Identification Activity ❑ Complete Daily Reflection Log	
	Day 87		Test	❑ Complete Self-Assessment Form ❑ Complete Career Exploration Form ❑ Review for Test ❑ Take Test ❑ Complete Daily Reflection Log	
	Day 88	**Review for Final Exam**	Review	❑ Review for Final Exam ❑ Complete Daily Reflection Log	
	Day 89	**Final Exam**	Test	❑ Take Final Exam ❑ Complete Daily Reflection Log	
	Day 90	**Scheduled Make-up Day/Inclement Weather Day**		❑ Scheduled Make-Up Day/Inclement Weather Day	

Introduction and How Cars Work

Photo: Library of Congress

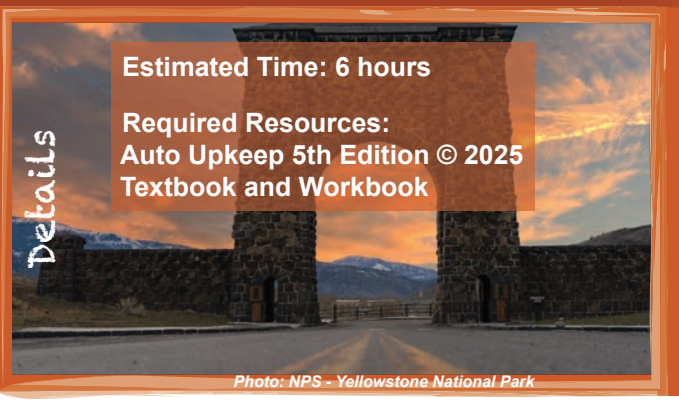


Photo: NPS - Yellowstone National Park

Chapter 1 - Lesson Plan

Unit lesson plans follow the Understanding by Design® (UbD™) framework. This framework consists of three stages:

- Stage 1 - Desired Results
  What should students know, understand, and be able to do?
- Stage 2 - Evidence
  What is the evidence that students understand?
- Stage 3 - Learning Plan
  What instructional method makes the most sense to support the desired learning?

Videos

Auto Upkeep Videos

www.Video.AutoUpkeep.com
Click on Chapter 1

Weblinks

Auto Upkeep Resources

www.AutoUpkeep.com/resources
Click on Chapter 1

Key Terms and Abbreviations

- Cugnot
- Benz
- Ford
- Automotive History
- Conservation of Energy
- Force
- Work
- Power
- Energy
- Torque
- Horsepower
- RPM
- Four-Stroke Engine
- Spark Ignition
- Compression Ignition
- Engine Configuration
- Displacement
- TDC
- BDC
- Cubic Inches
- Liters
- Compression Ratio
- VIN
- Make
- Model
- Year
- Trim Level
- Type
- Automotive Parts
- Automotive Systems
- Careers
- Workplace Skills

Stage 1 - Desired Results
(What should students know, understand, and be able to do?)

Goals

2024 ASE MLR Tasks

SPS.13, 14
PVS.1, 2
PVC.1
PS.1, 2, 3, 4, 5
WHE.1-14
I.B.1
I.C.1
VII.A.1
VIII.A.1

Transfer

Students will be able to independently use their learning to…

Textbook Objectives:
- Identify early automotive contributors.
- Differentiate between vehicle manufacturers, makes, models, and trim levels.
- Describe how cars work.
- Locate and use an online owner's manual.

Workbook Objectives:
- Identify important workplace skills and understand why they are integral to professionalism.
- Identify an automobile by manufacturer, model year, make, model, and trim level.
- Prepare a vehicle for service and return to the customer.
- Locate and use an online owner's manual.

Meaning

UNDERSTANDINGS *Students will understand that…*	ESSENTIAL QUESTIONS
1. Early automotive contributors included Nicholas Cugnot, Henry Ford, Carl Benz, among many others.	1. Who were early automotive contributors?
2. Automobiles are shifting from hardware-defined vehicles to software-defined vehicles and from ICEs to EVs.	2. How is the automotive paradigm shifting?
3. Many automotive events (e.g., Henry Ford's moving assembly line) contributed to the development of the automobile.	3. What were significant automotive events?
4. Energy is needed to make a car work.	4. How do cars work?
5. Force is a push or pull interaction between objects. Work is the transfer of energy from one object to another. Power is the rate at which work is done. Objects have the ability to do work when they have energy.	5. What is force, work, power, and energy?
6. The strokes in a four-stroke engine are intake, compression, power (combustion), and exhaust.	6. What are the stokes in a four-stroke engine?
7. In a spark ignition engine, a spark plug ignites gasoline or another fuel. In a compression ignition engine, compression ignites the diesel from high pressure and heat (no spark plugs).	7. How are spark ignition and compression ignition engines different?
8. Gasoline engines emit HC, NO_X, CO, and CO_2. Diesels emit NO_X and PM, in addition to green-house gas pollutants.	8. What pollutants occur from the combustion of gasoline and diesel?
9. EVs are emerging as a popular vehicle design.	9. What are possible future vehicle designs?
10. Vehicles are classified by their fuels and designs.	10. How are vehicles classified?
11. Engine size is important to know when purchasing parts and determining vehicle capabilities.	11. Why is it good to know the size of your vehicle's engine?
12. The 17-character VIN can be seen on the left side of the dash from outside the vehicle through the windshield or inside the driver's doorjamb.	12. What is the VIN and where is it located?
13. Vehicles are identified by their VIN, manufacturer, make, model, year, trim level, and type.	13. How are vehicles identified?
14. Parts and systems work together to make a car work.	14. What are parts and systems?
15. Manufacturing, service, repair, and support careers are available in the automotive field.	15. What careers are available in the automotive field?
16. Workplace skills, which include personal standards and work habits/ethics, are an important part of employment.	16. What are workplace skills?
17. Preparing a vehicle for service includes identifying information needed and the service requested, plus protecting the vehicle with fender covers, mats, seat, and steering wheel covers.	17. How should vehicles be prepared for service?
18. Preparing a vehicle for a customer includes following the school/company policy.	18. How should vehicles be prepared for the customer?
19. Online owner's manuals can be located using keyword search terms.	19. How do you locate and navigate an online owner's manual?

Stage 1 - Desired Results
(What should students know, understand, and be able to do?)

Acquisition

Students will know…	*Students will be skilled at…*
1. Early automotive contributors.	1. Identifying automotive contributors.
2. Automotive paradigms.	2. Explaining automotive paradigms.
3. Automotive significant events.	3. Listing automotive significant events.
4. How cars work.	4. Describing how cars work.
5. Force, work, power, and energy.	5. Differentiating between force, work, power, and energy.
6. The four strokes in a four-stroke engine.	6. Explaining the four strokes in a four-stroke engine.
7. Spark and compression ignition engines.	7. Distinguishing differences between spark and compression ignition engines.
8. Gasoline and diesel pollutants.	8. Relating pollutants to gasoline and diesel engines.
9. Future vehicle designs.	9. Proposing and discussing possible future vehicle designs.
10. Vehicle classifications.	10. Classifying vehicle types.
11. Engine size.	11. Identifying the engine size and configuration.
12. VIN locations and identification.	12. Locating and identifying the Vehicle Identification Number (VIN).
13. Vehicle identifications.	13. Practicing identifying and explaining differences between automobiles by the VIN, manufacturer, make, model, year, trim level, and type.
14. Automotive parts and systems.	14. Explaining how parts and systems work together to make a car work.
15. Automotive careers.	15. Identifying careers in the automotive industry.
16. Workplace skills.	16. Demonstrating workplace skills.
17. Vehicle preparation for service.	17. Preparing a vehicle for service.
18. Vehicle preparation for a customer.	18. Preparing a vehicle for a customer.
19. Online owner's manuals.	19. Navigating an online owner's manual.

Stage 2 - Evidence
(What is the evidence that students understand?)

Evaluation Criteria	Assessment Evidence
PERFORMANCE TASK(S): • Activity Rubric See Appendix L - Rubrics	**PERFORMANCE TASK(S):** • Workplace Skills Activity • Car Identification and Preparing for Vehicle Service Activity • Owner's Manual Activity
OTHER EVIDENCE: • Readability Worksheet Rubric • Daily Reflection Log Rubric • Article, Website, or Video Review Form Rubric • Study Questions Rubric • Self-Assessment Form Rubric • Career Exploration Form Rubric • Active Participation Rubric • Workplace Skills Rubric • Test Rubric See Appendix L - Rubrics	**OTHER EVIDENCE:** • Readability Worksheet • Daily Reflection Log • Article, Website, or Video Review Form • Study Questions • Self-Assessment Form • Career Exploration Form • Active Participation • Workplace Skills • Test

Stage 3 - Learning Plan
(What instructional method makes the most sense to support the desired learning?)

Summary of Key Learning Events and Instruction

Warm-Up:
Present essential questions.

Review:
Chapter 1 in the *Auto Upkeep Textbook*.

Assignments and Activities:
Students will…
- Complete Readability Worksheet
- Complete Article, Website, or Video Review Form
- Answer Study Questions
- Complete Workplace Skills Activity
- Complete Car Identification and Preparing for Vehicle Service Activity
- Complete Owner's Manual Activity
- Complete Self-Assessment Form
- Complete Career Exploration
- Review for Test
- Take Test
- Complete Daily Reflection Log

Closure/Summary:
- Discuss the results of the assignments and activities.
- Identify any difficulties students had while completing the assignments and activities.

Reflection and Self Evaluation
(What worked, what didn't? What should I change? Notes for next time.)

Chapter 1 - Readability Worksheet

Directions
Read the textbook to fill in the missing words from the sentences below.

1. The word “automobile” literally means _____.

2. The development of the _____ in 1860 made road vehicles more promising.

3. By the 1920s, _____ the cars in the world were Model T Fords.

4. A key concept to understand is that energy cannot be _____ or _____, it is just converted from one form to another.

5. Simply defined, force is a _____ or _____ interaction between objects.

6. When an object has moved from a force, the position of the object has _____ and _____ has occurred.

7. Power is the rate at which _____ is done (the amount of work done, energy delivered, in a given amount of _____).

8. The four-strokes of the spark ignition engine are _____, _____, _____ (combustion), and _____.

9. Compression ignition (CI) engines are fueled by _____.

10. Gasoline engines use _____ to ignite the air-fuel mixture in the engine.

11. The size of an engine is calculated from the cylinder displacement _____ during one piston stroke (bottom dead center (BDC) to top dead center (TDC)) multiplied by the number of cylinders in the engine.

12. A higher compression ratio means more work from same amount of fuel, increasing _____.

13. The _____ contains coded vehicle information.

14. The _____ of a vehicle refers to the specific name of each vehicle within a make.

15. _____ levels identify versions (different equipment and features) of the same vehicle model.

16. Parts that work together to perform a specific task make up a _____.

17. The _____ system uses oil or e-fluids to reduce wear and heat.

18. The _____ transfers power from the engine or e-motor to the wheels.

19. Automotive _____can work in a variety of repair facilities in different capacities to diagnose, service, and repair a vehicle.

20. Workplace skills, including personal standards, work habits, and _____, are integral to a professional work environment.

Chapter 1 - Study Questions

Directions

Use complete sentences to answer the following questions.

1. What was the earliest self-powered road vehicle?

2. Who was credited with the world's first practical motorcar?

3. What is the difference between force, work, power, and energy?

4. What are the strokes in a four-stroke internal combustion engine? What is the difference between a gasoline and a diesel engine?

5. What two units of measurement are used to classify engine sizes?

6. What is an engine configuration? List several examples.

7. What does the acronym VIN represent? What information is coded into the VIN?

8. What is the difference between a manufacturer and make?

9. What are the systems of the automobile?

10. What types of careers exist in the automotive industry?

Name_____ Class_____ Date_____ Score_____

Chapter 1 - Article, Website, or Video Review Form

Directions

Research an article, visit a website, or watch a video and then complete this form by writing sentences in your own words. Do not copy verbatim from the source.

BIBLIOGRAPHY

SUMMARY

OPINIONS/CONCLUSIONS/REACTIONS

Chapter 1 - Self-Assessment Form

Directions

Complete the self-assessment and identify your strengths, areas of improvement, values, goals, and achievements.

Score/Mastery							
A	B	C	D	F			
Master	Proficient	Apprentice	Novice	No Attempt			
4	3	2	1	0	Task/Skill	Domain	Level
					Chapter 1. Introduction and How Cars Work		
					Describe how cars work.	Cognitive	Knowledge
					Locate and identify the Vehicle Identification Number (VIN).	Psychomotor	Imitation
					Identify the engine size and configuration.	Cognitive	Knowledge
					Explain the difference between manufacturer, make, and model.	Cognitive	Comprehension
					Classify vehicle types.	Cognitive	Analysis
					Distinguish differences between spark and compression ignition engines.	Cognitive	Analysis
					Relate pollutants to gasoline and diesel engines.	Cognitive	Synthesis
					Propose and discuss possible future vehicle designs.	Affective	Valuing
					Practice identifying automobiles by model year, make, model, and type.	Psychomotor	Manipulation
					Differentiate between force, work, power, and energy.	Cognitive	Analysis
					Identify careers in the automotive industry.	Cognitive	Knowledge
					Navigate an online owner's manual.	Psychomotor	Manipulation

Grade Scale			
4.0 = A	3.0 = B	2.0 = C	1.0 = D
3.7 = A-	2.7 = B-	1.7 = C-	0.7 = D-
3.3 = B+	2.3 = C+	1.3 = D+	0 = F

Strengths: Identify tasks or skills that you are performing well.

_____

_____

Areas of Improvement: Identify tasks or skills that you can improve.

_____

_____

Values: Identify an example of values that are important.

_____

_____

Goals: Identify goals you would like to achieve relating to the content in this chapter.

_____

_____

Achievements: Identify accomplishments you reached relating to the content in this chapter.

_____

_____

Name_____ Class_____ Date_____ Score_____

Chapter 1 - Career Exploration Form

Directions

Use the Occupational Outlook Website (**www.bls.gov/ooh**) to research a career. As you identify the following, write complete sentences in your own words. Do not copy verbatim from the website.

Career

_____

Salary Potential

_____

Education/Training Required

_____

_____

_____

Job Outlook

_____

_____

_____

Nature of the Work

_____

_____

_____

_____

Working Conditions

_____

_____

_____

_____

_____

Reason You Chose this Career

_____

_____

_____

_____

_____

Chapter 1 - Test

Section 1: Selected Response

Directions

Place the letter that corresponds to the correct answer on the space provided.

___1. The _____ was one of the earliest self-powered vehicles.
a. Hummer
b. Cugnot steam traction engine
c. Tucker
d. Taurus

___2. Most 4-cylinder engines are configured in this way.
a. V
b. Slant
c. X
d. Inline

___3. Automobiles became popular in the _____ century.
a. 14th
b. 16th
c. 18th
d. 20th

___4. The VIN is commonly located on the _____.
a. dashboard
b. taillight
c. headlight
d. wheel

___5. The Ford Model T became famous for being _____.
a. the first car
b. mass-produced on a moving assembly line
c. hand built
d. blue in color

___6. Who patented the world's first practical motorcar?
a. Carl Benz
b. Henry Ford
c. Nicholas Cugnot
d. Ferdinand Porsche

___7. What is a push or pull interaction between objects?
a. force
b. work
c. power
d. energy

___8. Objects have the ability to do work when they have _____.
a. force
b. work
c. power
d. energy

___9. In a given amount of time, _____ is the rate at which work is done.
a. force
b. distance
c. power
d. energy

___10. What is the transfer of energy from one object to another?
a. force
b. work
c. power
d. energy

___11. What is the term used to describe a twisting force?
a. torque
b. work
c. horsepower
d. energy

___12. One _____ is the work needed to lift 550 pounds a distance of 1 foot in 1 second.
a. torque
b. rpm
c. horsepower
d. energy

___13. Gasoline engines use _____ to ignite the air-fuel mixture in the engine.
a. torque
b. compression
c. a catalyst
d. spark plugs

___14. How much work has been done if a force of 20 pounds was used to move an object 50 feet?
a. 20 lb
b. 50 feet
c. 70 ft-lb
d. 1000 ft-lb

___15. What is stored energy or energy of position?
a. potential
b. kinetic
c. movement
d. force

___16. All of the following vehicle protection supplies are generally used when preparing a vehicle for service EXCEPT:
a. a fender cover.
b. a steering wheel cover.
c. a floor mat.
d. wax.

___17. Early electric vehicles were more popular in cities because they were _____, quiet, and started easily.
a. inexpensive to buy
b. clean running
c. built on an assembly line
d. great for long drives

___18. In the 1910s, city streets became chaotic and dangerous with vehicles, pedestrians, bicycles, horses, and streetcars. Cleveland, Ohio was the first to install _____.
a. toll stations
b. electric red and green traffic lights
c. motor vehicle parking meters
d. pedestrian crosswalks

___19. Who perfected the electric self-starter for engines, replacing dangerous hand cranking?
a. Charles Kettering
b. Henry Ford
c. Ferdinand Porsche
d. David Buick

___20. Important workplace skills include all of the following EXCEPT:
a. assisting others and requesting help when needed.
b. negotiating solutions to conflicts.
c. contributing to an inclusive environment for coworkers and customers.
d. keeping helpful ideas to yourself.

Section 2: Selected Response ASE Style Questions

Directions

Place the letter that corresponds to the correct answer on the space provided.

___21. Technician A says that work habits and ethics are integral to a professional work environment. Technician B says that high personal standards in the workplace will not impact customer trust if you are good at diagnosing and fixing problems. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

___22. Technician A says that a walk-around inspection before vehicle service is a waste of time. Technician B says that you should always perform a walk-around inspection before performing vehicle service on a customer's vehicle. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

___23. Technician A says that gasoline engines have spark plugs to ignite the air-fuel mixture. Technician B says that diesel engines use compression to ignite the air-fuel mixture. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

___24. Technician A says that the day the vehicle comes off the assembly line is the model year. Technician B says that the model year can be located on the vehicle emission control information (VECI) sticker. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

___25. Technician A says that the number of cylinders within the engine block is used to identify the engine design. Technician B says that the engine configuration is used to identify the engine design. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

___26. Technician A says that engine size can be listed in liters. Technician B says that engine size can only be listed in cubic inches. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

___27. Technician A says that rotary motion of the pistons is converted to reciprocating motion of the crankshaft. Technician B says that rotary motion is up and down or back and forth. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

___28. Technician A says that strong math skills are important for an automotive technician. Technician B says that skills in communication and ethics are important for an automotive technician. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

Section 3: Constructed Response

Directions

Use complete sentences to answer the following questions. The criteria below will be used to assess your answers.

Outstanding (A = 4.0)	Very Good (B = 3.0)	Acceptable (C = 2.0)	Attempted (D = 1.0)	Did Not Attempt (F = 0)
Student demonstrates a complete understanding of the problem. Several details and examples were given to support the answer. The response was extremely well organized. Handwriting was very legible.	Student demonstrates a considerable understanding of the problem. Some details and examples were given to support the answer. The response was presented in a thoughtful manner. Handwriting was legible.	Student demonstrates a partial understanding of the problem. Few details and examples were given to support the answer. The response was somewhat organized, but did not have smooth transitions. Handwriting was legible.	Student demonstrates little understanding of the problem. Details and examples were not relevant or not given. The response was difficult to follow and confusing to the reader. However, the student made an honest attempt at answering the question. Handwriting was somewhat illegible.	No attempt was made to answer the question or handwriting was illegible.

29. How is power transferred in a gasoline powered vehicle?

30. What are the four strokes in the four-stroke spark ignition engine? What occurs during each stroke?

Chapter 1 - Readability Worksheet Answer Key

Directions
Read the textbook to fill in the missing words from the sentences below.

1. The word "automobile" literally means ___self-moving___.

2. The development of the ___internal combustion engine (ICE)___ in 1860 made road vehicles more promising.

3. By the 1920s, ___half___ the cars in the world were Model T Fords.

4. A key concept to understand is that energy cannot be ___created___ or ___destroyed___, it is just converted from one form to another.

5. Simply defined, force is a ___push___ or ___pull___ interaction between objects.

6. When an object has moved from a force, the position of the object has ___changed___ and ___work___ has occurred.

7. Power is the rate at which ___work___ is done (the amount of work done, energy delivered, in a given amount of ___time___).

8. The four-strokes of the spark ignition engine are ___intake___, ___compression___, ___power___ (combustion), and ___exhaust___.

9. Compression ignition (CI) engines are fueled by ___diesel___.

10. Gasoline engines use ___spark plugs___ to ignite the air-fuel mixture in the engine.

11. The size of an engine is calculated from the cylinder displacement ___volume___ during one piston stroke (bottom dead center (BDC) to top dead center (TDC)) multiplied by the number of cylinders in the engine.

12. A higher compression ratio means more work from same amount of fuel, increasing ___efficiency___.

13. The ___VIN___ contains coded vehicle information.

14. The ___model___ of a vehicle refers to the specific name of each vehicle within a make.

15. ___Trim___ levels identify versions (different equipment and features) of the same vehicle model.

16. Parts that work together to perform a specific task make up a ___system___.

17. The ___lubrication___ system uses oil or e-fluids to reduce wear and heat.

18. The ___drivetrain___ transfers power from the engine or e-motor to the wheels.

19. Automotive ___technicians___ can work in a variety of repair facilities in different capacities to diagnose, service, and repair a vehicle.

20. Workplace skills, including personal standards, work habits, and ___ethics___, are integral to a professional work environment.

Chapter 1 - Study Questions Answer Key

Directions
Use complete sentences to answer the following questions.

1. What was the earliest self-powered road vehicle?
   The Cugnot steam traction engine in 1769-1770 was the earliest self-powered road vehicle.

2. Who was credited with the world's first practical motorcar?
   Carl Benz was credited with building the world's first motorcar.

3. What is the difference between force, work, power, and energy?
   Force is a push or pull interaction between objects. When an object has moved from a force, the position of the object has changed and work has occurred. Power is the rate at which work is done. Energy is the "fuel" stored or used to perform work.

4. What are the strokes in a four-stroke internal combustion engine? What is the difference between a gasoline and a diesel engine?
   The four strokes are intake, compression, power (combustion), and exhaust. Gasoline powered engines use spark plugs to ignite the air-fuel mixture in the engine. Diesel engines are compression ignition engines; they do not have spark plugs.
5. What two units of measurement are used to classify engine sizes?
   Engine size is commonly listed in liters or cubic inches.

6. What is an engine configuration? List several examples.
   Engine configuration is the design of the engine block. Common engine configurations include inline, opposed, or V.

7. What does the acronym VIN represent? What information is coded into the VIN?
   VIN stands for Vehicle Identification Number. The VIN includes the following: country of origin, vehicle manufacturer, make, model, trim, type, etc. (e.g., engine size if applicable), check digit, model year, assembly plant, and the vehicle's serial number.

8. What is the difference between a manufacturer and make?
   An automotive manufacturer (example GM) is a company that produces vehicles. Automotive manufacturers identify the various vehicles they produce by their make (example Cadillac).
9. What are the systems of the automobile?
   Parts that work together to perform a specific task make up a system. Automotive systems include: electrical; lubrication; fuel; cooling and climate control; ignition; suspension, steering, and tires; braking; drivetrain; and exhaust and emission.
10. What types of careers exist in the automotive industry?
    Many automotive careers exist. These include, but are not limited to, automotive manufacturing, service and repair, software developer, information technology (IT) technician, automotive electrician, mechatronic engineer, ADAS calibration technician, along with other careers that support the industry.

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Chapter 1 - Test Answer Key

Section 1: Selected Response

Directions

Place the letter that corresponds to the correct answer on the space provided.

__b__ 1. The _____ was one of the earliest self-powered vehicles.
a. Hummer
b. Cugnot steam traction engine
c. Tucker
d. Taurus

__d__ 2. Most 4-cylinder engines are configured in this way.
a. V
b. Slant
c. X
d. Inline

__d__ 3. Automobiles became popular in the _____ century.
a. 14th
b. 16th
c. 18th
d. 20th

__a__ 4. The VIN is commonly located on the _____.
a. dashboard
b. taillight
c. headlight
d. wheel

__b__ 5. The Ford Model T became famous for being _____.
a. the first car
b. mass-produced on a moving assembly line
c. hand built
d. blue in color

__a__ 6. Who patented the world's first practical motorcar?
a. Carl Benz
b. Henry Ford
c. Nicholas Cugnot
d. Ferdinand Porsche

__a__ 7. What is a push or pull interaction between objects?
a. force
b. work
c. power
d. energy

__d__ 8. Objects have the ability to do work when they have _____.
a. force
b. work
c. power
d. energy

__c__ 9. In a given amount of time, _____ is the rate at which work is done.
a. force
b. distance
c. power
d. energy

__b__ 10. What is the transfer of energy from one object to another?
a. force
b. work
c. power
d. energy

__a__ 11. What is the term used to describe a twisting force?
a. torque
b. work
c. horsepower
d. energy

__c__ 12. One _____ is the work needed to lift 550 pounds a distance of 1 foot in 1 second.
a. torque
b. rpm
c. horsepower
d. energy

d 13. Gasoline engines use _____ to ignite the air-fuel mixture in the engine.
a. torque
b. compression
c. a catalyst
d. spark plugs

d 14. How much work has been done if a force of 20 pounds was used to move an object 50 feet?
a. 20 lb
b. 50 feet
c. 70 ft-lb
d. 1000 ft-lb

a 15. What is stored energy or energy of position?
a. potential
b. kinetic
c. movement
d. force

d 16. All of the following vehicle protection supplies are generally used when preparing a vehicle for service EXCEPT:
a. a fender cover.
b. a steering wheel cover.
c. a floor mat.
d. wax.

b 17. Early electric vehicles were more popular in cities because they were _____, quiet, and started easily.
a. inexpensive to buy
b. clean running
c. built on an assembly line
d. great for long drives

b 18. In the 1910s, city streets became chaotic and dangerous with vehicles, pedestrians, bicycles, horses, and streetcars. Cleveland, Ohio was the first to install _____.
a. toll stations
b. electric red and green traffic lights
c. motor vehicle parking meters
d. pedestrian crosswalks

a 19. Who perfected the electric self-starter for engines, replacing dangerous hand cranking?
a. Charles Kettering
b. Henry Ford
c. Ferdinand Porsche
d. David Buick

d 20. Important workplace skills include all of the following EXCEPT:
a. assisting others and requesting help when needed.
b. negotiating solutions to conflicts.
c. contributing to an inclusive environment for coworkers and customers.
d. keeping helpful ideas to yourself.

Section 2: Selected Response ASE Style Questions

Directions

Place the letter that corresponds to the correct answer on the space provided.

a 21. Technician A says that work habits and ethics are integral to a professional work environment. Technician B says that high personal standards in the workplace will not impact customer trust if you are good at diagnosing and fixing problems. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

b 22. Technician A says that a walk-around inspection before vehicle service is a waste of time. Technician B says that you should always perform a walk-around inspection before performing vehicle service on a customer's vehicle. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

c 23. Technician A says that gasoline engines have spark plugs to ignite the air-fuel mixture. Technician B says that diesel engines use compression to ignite the air-fuel mixture. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

b 24. Technician A says that the day the vehicle comes off the assembly line is the model year. Technician B says that the model year can be located on the vehicle emission control information (VECI) sticker. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

c 25. Technician A says that the number of cylinders within the engine block is used to identify the engine design. Technician B says that the engine configuration is used to identify the engine design. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

a 26. Technician A says that engine size can be listed in liters. Technician B says that engine size can only be listed in cubic inches. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

d 27. Technician A says that rotary motion of the pistons is converted to reciprocating motion of the crankshaft. Technician B says that rotary motion is up and down or back and forth. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

c 28. Technician A says that strong math skills are important for an automotive technician. Technician B says that skills in communication and ethics are important for an automotive technician. Who is correct?
a. Technician A
b. Technician B
c. Both Technician A and Technician B
d. Neither Technician A nor Technician B

Section 3: Constructed Response

Directions

Use complete sentences to answer the following questions. The criteria below will be used to assess your answers.

Outstanding (A = 4.0)	Very Good (B = 3.0)	Acceptable (C = 2.0)	Attempted (D = 1.0)	Did Not Attempt (F = 0)
Student demonstrates a complete understanding of the problem. Several details and examples were given to support the answer. The response was extremely well organized. Handwriting was very legible.	Student demonstrates a considerable understanding of the problem. Some details and examples were given to support the answer. The response was presented in a thoughtful manner. Handwriting was legible.	Student demonstrates a partial understanding of the problem. Few details and examples were given to support the answer. The response was somewhat organized, but did not have smooth transitions. Handwriting was legible.	Student demonstrates little understanding of the problem. Details and examples were not relevant or not given. The response was difficult to follow and confusing to the reader. However, the student made an honest attempt at answering the question. Handwriting was somewhat illegible.	No attempt was made to answer the question or handwriting was illegible.

29. How is power transferred in a gasoline powered vehicle?

1. Fuel is stored as chemical energy in the gas tank. 2. Fuel is transported to the engine by a fuel pump. 3. Air-fuel mixture enters the engine. 4. Electrical energy is used to create a spark at the spark plug. 5. Combustion occurs, converting the chemical energy to kinetic energy. 6. The reciprocating motion of the pistons is converted to rotary (circular) motion of the crankshaft. 7. The crankshaft's rotary motion turns the transmission. 8. On FWD vehicles, rotary motion is transferred through a transaxle then through the CV shafts. On RWD vehicles, rotary power is transferred from the transmission through the drive shaft, to a differential, and then through axles. 9. The axle shafts or CV shafts turn the wheels. 10. The rotary motion of the wheels converts to linear motion on the roadway.

30. What are the four strokes in the four-stroke spark ignition engine? What occurs during each stroke?

Intake stroke – Intake valve is open. Exhaust valve is closed. Piston moves down. Air-fuel mixture enters the combustion chamber.

Compression stroke – Intake and exhaust valves are closed. Piston moves up. Air-fuel mixture is compressed.

Power (Combustion) stroke – Intake and exhaust valves are closed. A spark plug ignites the fuel. Piston is forced down by combustion. This is the stroke that provides the power.

Exhaust stroke – Exhaust valve opens. Intake valve is closed. Piston moves up, pushing exhaust gases out of the engine.

Auto Upkeep
Certificate of Completion

This is to certify that

_____

has completed

Introduction and How Cars Work

on this _____ day of _____ in the year _____

_____
Michael E. Gray
Michael E. Gray
Auto Upkeep

_____
Instructor

Appendix A - Safety Rules

Note: This list is not all-inclusive. Follow safety guidelines provided by OSHA, EPA, safety data sheets, your instructor, and tool, equipment, and chemical manufacturers.

Personal Protection

- Safety glasses are not optional. Wear them at all times when working on a vehicle. ***Note: Ordinary prescription glasses are not safety glasses. You can purchase approved prescription safety glasses with side shields.***
- Do not have bare feet or wear open toe sandals. Wear shoes that protect your feet.
- Loud noises can damage your hearing, so wear ear protection (e.g., earplugs or earmuffs).
- Keep your tools and hands free of grease and oil. Wearing mechanic gloves is smart, but do not wear gloves when moving parts are present. Keep your hands away from moving parts. Never use your hands to stop components that are moving.
- Remove your rings, watch, and other jewelry. If you have long hair, tie it back. It could get caught in moving parts. Do not wear loose or baggy clothing that could get caught in moving parts.
- Use the appropriate respirator when hazardous dust or airborne chemicals are present.
- Do not touch spark plug wires while the engine is running. Tens of thousands of volts are present.
- Never put your hands on or near the cooling fan. Many fans are electric and can start at anytime, even if the ignition is off.
- Do not work on a hot engine. Never open a hot radiator cap.
- Use proper lifting procedures to avoid injury. Use your legs, not your back.
- Be aware of vehicles with high voltage. See Chapter 21 to learn about high-voltage personal protection equipment (PPE). ***Warning: Be careful around high voltage. High voltage can kill. Identify high-voltage systems by their orange cables.***

Shop/Lab Procedures

- Know the location and operational procedures of fire extinguishers, first-aid kits, safety data sheets, eyewash stations, and a telephone. Dial 911 for emergencies. Have an evacuation route out of the shop identified.
- Someone must be sitting in the driver's seat whenever a car is started and/or running.
- The exhaust system of a running engine must be connected to a ventilation system if the vehicle is in an enclosed location such as a garage. ***Warning: Carbon monoxide is a colorless, odorless, and poisonous gas. Proper ventilation is required.***
- Always engage the parking brake to prevent the vehicle from moving.
- Put oily rags in an approved can for combustible materials.
- Always clean up spilled oil and grease off the floor. Sawdust, cat litter, and safety absorbent (floor dry) work well for this.
- Never pour chemicals, solvents, antifreeze, or oil down the sanitary drain. Put them in their proper containers to be recycled.
- Use an approved safety cabinet for flammable materials. Do not use gasoline to clean parts.
- OSHA states that compressed air shall not be used for cleaning purposes (parts or objects) except where reduced to less than 30 pounds per square inch (psi) and then only with effective chip guarding and appropriate personal protective equipment (PPE). Never (at any pressure or under any circumstances) use compressed air to clean off clothes or your body. Never point an airline toward your skin, your body, or another person.

Hand Tools, Power Tools, and Shop Equipment Safety

- Use the proper tool for each job. Make sure tools and equipment have all the proper guards installed. Operate tools and equipment according to the manufacturers' instructions. Do not put sharp or pointed tools in your pocket.
- Avoid tripping hazards. Stand creepers up and place floor jack handles in the up position when not being used.
- Be cautious where sparks are falling when grinding, cutting, or welding.
- If a car is off the ground (except when on an automotive lift), it must be supported by jack stands.
- Do not use chisels or punches with mushroomed heads. When striking the ends with a hammer, the heads might shatter on impact, causing fragments to become airborne.
- Wrenches must not be used when jaws are sprung, malformed, or bent. Slippage can occur.
- Secure work with a vise or clamp. Operate a tool with both hands as recommended by the manufacturer.
- Maintain good footing and keep yourself balanced when operating power tools.
- Do not put tools on top of a vehicle's battery. Accidentally touching both terminals will cause a spark, which could lead to an explosion.
- Inspect electrical cords for fraying before use. Do not use electric tools in damp or wet locations. Electric tools must have a three-wire cord with a ground and be plugged into a properly grounded receptacle or be double-insulated.
- Prior to grinding, stand off to the side and allow the grinder to get up to full operating speed. A grinding wheel can explode during start-up.

Name_____ Class_____ Date_____ Score_____

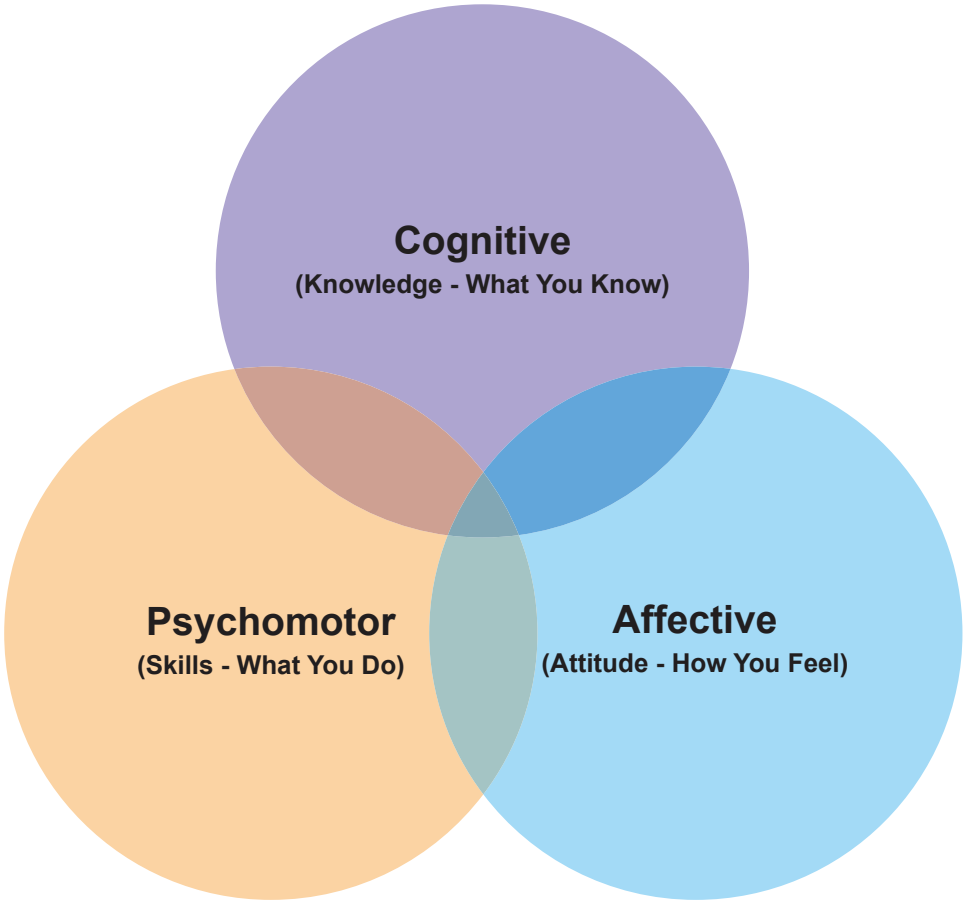
Appendix B - Activity Completion Record

	Activity	Date	Points	Grade
CHAPTER 1	Workplace Skills and Activity			
	Car Identification and Preparing for Vehicle Service Activity			
	Owner's Manual Activity			
CHAPTER 2	Towing and Hauling Activity			
	Advanced Driver Assistance Systems (ADAS) Activity			
	Buying a New Automobile Activity			
	Buying a Used Automobile Activity			
CHAPTER 3	Automotive Expenses Activity			
CHAPTER 4	Repair Facilities Activity			
CHAPTER 5	Automotive Safety Activity			
	Safety Data Sheet (SDS) Activity			
	Personal Protection Equipment (PPE) and Fire Safety Activity			
CHAPTER 6	Tools and Equipment Activity			
	Fasteners Activity			
	Service Manual Activity			
CHAPTER 7	Interior Cleaning Activity			
	Exterior Cleaning Activity			
	Waxing Activity			
CHAPTER 8	Fluid Level Check Activity			
CHAPTER 9	Ohm's Law Activity			
	Circuit Construction Simulator Activity			
	Simple Circuits Activity			
	Voltage Drop Activity			
	Wiring Diagram Activity			
	Battery Activity			
	Charging Activity			
	Starting Activity			
CHAPTER 10	Oil and Filter Change Activity			
CHAPTER 11	Fuel System Part Identification Activity			
	Fuel System Maintenance Activity			
CHAPTER 12	Air Conditioning Activity			
	Cabin Air Filter Activity			
	Cooling System Activity			
CHAPTER 13	Ignition System Activity			
CHAPTER 14	Suspension and Steering Activity			
	Tire Inspection and Rotation Activity			
	Choosing the Right Tires Activity			
CHAPTER 15	Brake Inspection Activity			
CHAPTER 16	Drivetrain Activity			
CHAPTER 17	Exhaust and Emission Activity			
CHAPTER 18	Payback Period Activity			
	Future Vehicle Activity			
CHAPTER 19	Automotive Accessories Activity			
CHAPTER 20	Changing a Flat Tire Activity			
	Jump-Starting Activity			
	Lighting Activity			
	Replacing Wipers Activity			
	On-Board Diagnostics Activity			
CHAPTER 21	Electric Vehicles Activity			
CHAPTER 22	ADAS and Vehicle Automation Level Identification Activity			
			Total Points	Overall Grade

Appendix C - Domains of Learning

The *Auto Upkeep* curriculum focuses on three domains of learning: cognitive, psychomotor, and affective. Think of domains as categories of learning. The tasks/skills listed in the *Auto Upkeep Competency Profile* are categorized into the corresponding domain and the level of learning within that domain. These are the things that students should know and be able to do after completing the learning activities.

	Cognitive (Knowledge - Think)	Psychomotor (Skills - Do)	Affective (Attitudes - Feel)	
Higher Levels ↑	Evaluation	Naturalization	Characterization	↑ More Complex
	Synthesis	Articulation	Organization	
	Analysis	Precision	Valuing	
	Application	Manipulation	Responding	
	Comprehension	Imitation	Receiving	
	Knowledge			



Name_____ Class_____ Date_____ Score_____

Appendix D - Competency Profile/Task List

Score/Mastery				
A	B	C	D	F
Master	Proficient	Apprentice	Novice	No Attempt
4	3	2	1	0

Grade Scale			
4.0 = A	3.0 = B	2.0 = C	1.0 = D
3.7 = A-	2.7 = B-	1.7 = C-	0.7 = D-
3.3 = B+	2.3 = C+	1.3 = D+	0 = F

Task/Skill	Domain	Level
Chapter 1. Introduction and How Cars Work		
Describe how cars work.	Cognitive	Knowledge
Locate and identify the Vehicle Identification Number (VIN).	Psychomotor	Imitation
Identify the engine size and configuration.	Cognitive	Knowledge
Explain the difference between manufacturer, make, and model.	Cognitive	Comprehension
Classify vehicle types.	Cognitive	Analysis
Distinguish differences between spark and compression ignition engines.	Cognitive	Analysis
Relate pollutants to gasoline and diesel engines.	Cognitive	Synthesis
Propose and discuss possible future vehicle designs.	Affective	Valuing
Practice identifying automobiles by model year, make, model, and type.	Psychomotor	Manipulation
Differentiate between force, work, power, and energy.	Cognitive	Analysis
Identify careers in the automotive industry.	Cognitive	Knowledge
Navigate an online owner's manual.	Psychomotor	Manipulation
Chapter 2. Buying an Automobile		
Differentiate between transportation needs and wants.	Cognitive	Analysis
Develop a budget.	Cognitive	Application
Identify the steps in purchasing an automobile.	Cognitive	Knowledge
Compare and contrast different places to purchase an automobile.	Cognitive	Evaluation
Calculate a reasonable offer for a vehicle.	Cognitive	Application
Advocate for safety features in an automobile.	Affective	Characterization
Carry out research on vehicles using available resources.	Psychomotor	Imitation
Evaluate window stickers.	Cognitive	Evaluation
Conduct a vehicle inspection.	Psychomotor	Manipulation
Propose the benefits of selling, trading in, or donating a used vehicle.	Affective	Valuing
Chapter 3. Automotive Expenses		
Explain how car payments are calculated.	Cognitive	Synthesis
Describe insurance coverage levels.	Cognitive	Evaluation
Propose when it may be beneficial to have additional insurance.	Affective	Valuing
Calculate monthly expenses on a given vehicle.	Cognitive	Application
Explain depreciation.	Cognitive	Comprehension
Differentiate between maintenance and repairs.	Cognitive	Analysis
Chapter 4. Repair Facilities		
Describe how technicians can become certified.	Cognitive	Knowledge
Communicate effectively with a technician or service writer.	Affective	Responding
Interpret a work order/repair invoice.	Cognitive	Evaluation
Demonstrate use of the three C's (concern, cause, and correction).	Psychomotor	Imitation
List and describe different types of facilities.	Cognitive	Knowledge
Conduct research to locate a quality repair facility.	Psychomotor	Manipulation
Characterize business ethics.	Affective	Characterization
Summarize differences between warranty types.	Cognitive	Evaluation

4	3	2	1	0	Task/Skill	Domain	Level
					Chapter 5. Safety Around the Automobile		
					Demonstrate safe work practices.	Psychomotor	Precision
					Identify types of fires and explain what types of fire extinguishers to use.	Cognitive	Synthesis
					Explain the fire triangle.	Cognitive	Comprehension
					Evaluate when to wear specific personal protection equipment (PPE).	Cognitive	Evaluation
					Describe the purpose of OSHA and the EPA.	Cognitive	Knowledge
					Use different types of automotive lifts to safely support a vehicle.	Psychomotor	Precision
					Operate a jack and use jack stands to safely support a vehicle.	Psychomotor	Precision
					Judge when it is safe to work on a vehicle with airbag systems.	Affective	Organization
					Explain right-to-know laws.	Cognitive	Comprehension
					Interpret safety data sheets (SDSs).	Cognitive	Comprehension
					Practice safe lifting and carrying techniques.	Psychomotor	Imitation
					Identify factors that affect noise-induced hearing loss.	Cognitive	Knowledge
					Insert foam earplugs properly.	Psychomotor	Precision
					Chapter 6. Tools, Fasteners, and Equipment		
					Recognize basic hand tools.	Cognitive	Comprehension
					Select the correct tool for the job.	Cognitive	Evaluation
					Use tools properly.	Psychomotor	Precision
					Utilize print and online service manuals.	Psychomotor	Precision
					Classify socket types.	Cognitive	Analysis
					Identify different types of wrenches.	Cognitive	Analysis
					Identify different types of pliers.	Cognitive	Analysis
					List the different types of screwdriver tips.	Cognitive	Knowledge
					Decide when it is justified to invest in a specialty tool.	Affective	Organization
					Categorize units into SI (metric) or U.S. Customary system.	Cognitive	Synthesis
					Differentiate between electric-, air-, and battery-powered tools.	Cognitive	Analysis
					Demonstrate the proper use of vehicle protection.	Psychomotor	Precision
					Chapter 7. Auto Care and Cleaning		
					Identify different automotive finishes.	Cognitive	Knowledge
					Explain the importance of interior and exterior cleaning.	Cognitive	Evaluation
					Clean a vehicle inside and out.	Psychomotor	Articulation
					Wax a vehicle.	Psychomotor	Manipulation
					Differentiate between claying, polishing, and waxing.	Cognitive	Synthesis
					Describe how to clean an engine compartment.	Cognitive	Comprehension
					Locate and lubricate hinges, latches, and locks.	Psychomotor	Manipulation
					Repair a chip or scratch in a vehicle's finish.	Psychomotor	Manipulation
					Explain how paintless dent repair works.	Cognitive	Knowledge
					Chapter 8. Fluid Level Check		
					Identify vehicle information for the correct fluid type.	Cognitive	Knowledge
					Identify different types of fluids used in an automobile.	Cognitive	Knowledge
					Describe differences between coolant types.	Cognitive	Knowledge
					Follow safety warnings listed on chemical containers.	Psychomotor	Precision
					Analyze fluid conditions.	Cognitive	Analysis
					Perform basic fluid level checks.	Psychomotor	Articulation
					Add fluids when required.	Psychomotor	Manipulation
					Justify using more environmentally friendly coolants.	Affective	Valuing
					Summarize why it is important to add the correct types of fluids.	Cognitive	Evaluation
					Store and dispose of chemicals properly.	Psychomotor	Manipulation

4	3	2	1	0	Task/Skill	Domain	Level
					Chapter 9. Electrical System		
					Define electricity in terms of voltage, current, and resistance.	Cognitive	Knowledge
					Interpret a wiring diagram.	Cognitive	Analysis
					Explain different types of electrical circuits.	Cognitive	Comprehension
					Analyze different types of circuit problems.	Cognitive	Analysis
					Use a digital multimeter to test for voltage, resistance, and current.	Psychomotor	Manipulation
					Use Ohm's law to calculate for voltage, resistance, or current.	Cognitive	Application
					Locate, identify, and inspect starting system components.	Psychomotor	Manipulation
					Locate, identify, and inspect charging system components.	Psychomotor	Manipulation
					Test an AC generator (alternator).	Psychomotor	Manipulation
					Test a starter.	Psychomotor	Manipulation
					Clean and test an SLI battery.	Psychomotor	Manipulation
					Explain battery performance ratings.	Cognitive	Comprehension
					Inspect belt conditions.	Psychomotor	Manipulation
					Locate fuse junction blocks.	Psychomotor	Manipulation
					Describe different fuse types.	Cognitive	Knowledge
					Remove, inspect, and replace a blade style fuse.	Psychomotor	Imitation
					Differentiate between bulb types.	Cognitive	Analysis
					Chapter 10. Lubrication System		
					Define the purpose of engine oil.	Cognitive	Knowledge
					List and describe engine oil additives.	Cognitive	Comprehension
					Explain oil service and viscosity ratings.	Cognitive	Comprehension
					Differentiate between conventional, synthetic, and semi-synthetic oils.	Cognitive	Analysis
					Discuss the importance of oil filters.	Cognitive	Comprehension
					Change the oil and filter on a vehicle.	Psychomotor	Manipulation
					Advocate for the importance of oil recycling.	Affective	Characterization
					Chapter 11. Fuel System		
					Explain the purpose of the fuel system.	Cognitive	Comprehension
					Locate, identify, and inspect fuel system components.	Psychomotor	Manipulation
					Remove, inspect, and replace an air filter.	Psychomotor	Manipulation
					Remove and replace a fuel filter.	Psychomotor	Manipulation
					State gasoline and diesel properties.	Cognitive	Knowledge
					Identify ways to improve fuel economy.	Cognitive	Comprehension
					Explain how fuel is priced.	Cognitive	Evaluation
					Justify the use of clean burning fuels.	Affective	Valuing
					Explain how a turbocharger works.	Cognitive	Comprehension
					Chapter 12. Cooling System and Climate Control		
					Identify the purpose of the cooling system.	Cognitive	Comprehension
					Locate, identify, and inspect cooling system components.	Psychomotor	Manipulation
					Define coolant properties.	Cognitive	Knowledge
					Explain how coolant flows in an engine.	Cognitive	Comprehension
					Test coolant properties.	Psychomotor	Manipulation
					Change a cabin air filter.	Psychomotor	Manipulation
					List causes of engine overheating.	Cognitive	Knowledge
					Identify what to do if a vehicle overheats.	Cognitive	Knowledge
					Explain how charge-air coolers work.	Cognitive	Comprehension
					Analyze the benefits of active warm-up devices.	Cognitive	Analysis
					Explain how the air conditioning system works.	Cognitive	Comprehension

4	3	2	1	0	Task/Skill	Domain	Level
Chapter 13. Ignition System							
					Define the purpose of the ignition system.	Cognitive	Knowledge
					Identify ignition system generations.	Cognitive	Analysis
					Categorize ignition system components into respective generations.	Cognitive	Analysis
					Remove, inspect, gap, and replace spark plugs.	Psychomotor	Manipulation
					Test spark plug wire resistance.	Psychomotor	Manipulation
					Remove, inspect, and replace COP boots.	Psychomotor	Manipulation
					Differentiate between interference and non-interference engines.	Cognitive	Analysis
Chapter 14. Suspension, Steering, and Tires							
					Define the purpose of the suspension system.	Cognitive	Knowledge
					Locate, identify, and inspect suspension system components.	Psychomotor	Manipulation
					Define the purpose of the steering system.	Cognitive	Knowledge
					Locate, identify, and inspect steering system components.	Psychomotor	Manipulation
					Describe different tread designs.	Cognitive	Knowledge
					Identify repairable and non-repairable areas on a tire.	Cognitive	Knowledge
					Inspect and rotate tires.	Psychomotor	Manipulation
					Measure tire tread depth.	Psychomotor	Manipulation
					Locate the tire placard on a vehicle.	Psychomotor	Manipulation
					List causes of excessive tire wear.	Cognitive	Knowledge
					Analyze reasons for snow tire use vs. all-season tires.	Cognitive	Analysis
					Explain when run flat technology may be beneficial.	Cognitive	Knowledge
					Explain how EV-specific tires are designed different from standard tires.	Cognitive	Comprehension
Chapter 15. Braking System							
					Define the purpose and principles of the braking system.	Cognitive	Knowledge
					Locate, identify, and inspect braking system components.	Psychomotor	Manipulation
					Explain how regenerative braking works.	Cognitive	Comprehension
					Identify brake fluid properties.	Cognitive	Comprehension
					Discuss the advantage of antilock brakes.	Cognitive	Comprehension
					Explain how the parking brake works.	Cognitive	Comprehension
					Perform a disc brake inspection and measure brake pad thickness.	Psychomotor	Articulation
					Categorize different types of control and safety systems.	Cognitive	Synthesis
Chapter 16. Drivetrain							
					Define the purpose of the drivetrain.	Cognitive	Knowledge
					Locate, identify, and inspect drivetrain components.	Psychomotor	Manipulation
					Describe different drivetrain configurations.	Cognitive	Comprehension
					Calculate gear ratios.	Cognitive	Application
					Explain the operational stages of a torque converter.	Cognitive	Comprehension
					Compare various types of differentials.	Cognitive	Comprehension
					Communicate CVT benefits.	Affective	Responding
Chapter 17. Exhaust and Emission System							
					Define the purpose of the exhaust and emission system.	Cognitive	Knowledge
					Locate, identify, and inspect exhaust and emission system components.	Psychomotor	Manipulation
					Identify different types of automotive emissions.	Cognitive	Comprehension
					Explain how emission standards have evolved over time.	Cognitive	Comprehension
					Explain how the catalytic converter works.	Cognitive	Comprehension
					Locate the vehicle emission control information (VECI) sticker.	Psychomotor	Manipulation
					Explain how diesel aftertreatment technologies work.	Cognitive	Comprehension
					Describe the benefits of a properly working emission system.	Affective	Valuing

4	3	2	1	0	Task/Skill	Domain	Level
					Chapter 18. Alternative Fuels and Designs		
					Identify differences in automotive design, depending on the fuel source.	Cognitive	Analysis
					Differentiate tailpipe and upstream emissions.	Affective	Valuing
					Compare and contrast different alternative vehicle types.	Cognitive	Evaluation
					Compare petrobased and biobased fuels.	Cognitive	Evaluation
					Calculate the payback period on an alternative fueled vehicle.	Cognitive	Analysis
					Compare energy content in different fuel types.	Cognitive	Evaluation
					Differentiate between plug-in, full, and mild hybrids.	Cognitive	Analysis
					Describe different types of hybrid drivetrains.	Cognitive	Knowledge
					Illustrate how hydrogen can be used to power an electric motor.	Cognitive	Application
					Categorize different levels of automation.	Cognitive	Synthesis
					Discuss technological issues with alternative fueled vehicles.	Affective	Responding
					Chapter 19. Automotive Accessories		
					Identify available automotive accessories.	Cognitive	Analysis
					Explain different accessory functions.	Cognitive	Comprehension
					Estimate the cost of selected accessories for a specific vehicle.	Cognitive	Application
					Discuss the issues associated using electronic devices while driving.	Affective	Valuing
					Describe how a global positioning system works.	Cognitive	Comprehension
					Discuss negative impacts of remote starters.	Affective	Organizing
					Describe hitch classifications.	Cognitive	Knowledge
					Chapter 20. Common Problems and Roadside Emergencies		
					Identify common automotive problems.	Cognitive	Analysis
					Analyze basic automotive problems and formulate a solution.	Cognitive	Analysis
					Remove and replace a headlight.	Psychomotor	Manipulation
					Explain the different causes of black, blue, and white smoke.	Cognitive	Comprehension
					Identify unusual sounds and associate a possible problem to that sound.	Cognitive	Analysis
					Identify unusual smells and associate a possible problem to that smell.	Cognitive	Analysis
					Explain what might cause a “no-start” situation.	Cognitive	Comprehension
					Clean an SLI battery.	Psychomotor	Manipulation
					Inspect, remove, and replace wiper blades.	Psychomotor	Manipulation
					Locate a leak on a tire.	Psychomotor	Manipulation
					List items that should be in an emergency roadside and a winter safety kit.	Cognitive	Knowledge
					Perform a jump-start safely.	Psychomotor	Manipulation
					Inspect, remove, and replace a drive belt.	Psychomotor	Manipulation
					Remove and replace a flat tire with a spare tire.	Psychomotor	Manipulation
					Chapter 21. Electric Vehicles		
					Explain how an electric vehicle works.	Cognitive	Comprehension
					Describe what contributes to exterior design efficiency.	Cognitive	Comprehension
					Differentiate between electric vehicle charging levels.	Cognitive	Analysis
					Conduct research to identify and compare current electric vehicles.	Cognitive	Evaluation
					Explain the unique hazmat risks associated with lithium-ion battery fires.	Cognitive	Comprehension
					Chapter 22. Next-Generation Vehicles		
					Contrast a software-defined vehicle with a legacy architecture vehicle.	Cognitive	Evaluation
					Describe technologies made possible by the electromagnetic spectrum.	Cognitive	Comprehension
					Differentiate between the SAE J3016™ Levels of Driving Automation.	Cognitive	Analysis
					Discuss how artificial intelligence will impact autonomous vehicles.	Cognitive	Evaluation
					Explain operational design domains and why they are important.	Cognitive	Comprehension
					Discuss ethical issues with driverless and fully autonomous vehicles.	Affective	Responding

Appendix E - Daily Reflection Log

Directions

At the end of each day, write a short paragraph reflecting on what you learned.

Monday

Tuesday

Wednesday

Thursday

Friday

Name_____ Class_____ Date_____ Score_____

Appendix F - Article, Website, or Video Review Form

Directions

Research an article, visit a website, or watch a video and then complete this form by writing sentences in your own words. Do not copy verbatim from the source.

Bibliography

Summary

Opinions/Conclusions/Reactions

Appendix G - Career Exploration Form

Directions

Use the Occupational Outlook Website (www.bls.gov/ooh) to research a career. As you identify the following, write complete sentences in your own words. Do not copy verbatim from the website.

Career

_____

Salary Potential

_____

Education/Training Required

_____

_____

_____

Job Outlook

_____

_____

_____

Nature of the Work

_____

_____

_____

_____

Working Conditions

_____

_____

_____

_____

_____

Reason You Chose this Career

_____

_____

_____

_____

_____

Name_____ Class_____ Date_____ Score_____

Appendix H - Work Order/Repair Invoice

Repair and Service Facility
123 Main Ave.
Anytown, USA
555-0100

Work Order Number: _____

Date & Time Received: ___/___/___ ___:___AM PM
Promised: ___/___/___ ___:___AM PM
Order Written By: _____

Customer Contact Information		
Name:		
Address:		
City:	State:	Zip:
Phone Home: ( )		
Work: ( )	Cell: ( )	

Vehicle Information		
Year/Color		
Make/Model/Trim		
License Plate		
Odometer Reading	IN	OUT
Engine Size		
VIN		

Description of Customer Concern

Possible Cause

Customer Rights	
Do you want your parts returned?	Yes ❑ No ❑
Do you want a written estimate?	Yes ❑ No ❑
If the job exceeds the estimate by 10% or more, do you authorize us in proceeding?	Yes ❑ No ❑
If additional repairs are found necessary, do you authorize us in proceeding?	Yes ❑ No ❑
Do you request a written estimate for repairs with cost in excess of $50.00?	Yes ❑ No ❑

Estimate of Repair	
Parts	$
Labor Rate $ ____ per Hr. x ___ Hrs.	$
Other/Supplies	$
Preliminary Estimate Total	$

I hereby authorize the above repair work to be done with the necessary materials, and hereby grant you and/or your employees permission to operate the vehicle herein described on streets, highways, or elsewhere for the purpose of testing and/or inspection. An express mechanic's lien is hereby acknowledged on above vehicle to secure the amount of repairs thereof.
Authorized By_____

❑ **Lubricate Chassis** ❑ **Change Oil** ❑ **Check All Fluids** ❑ **Rotate Tires** ❑ **Wash**

Parts Required			
Qty.	Item No.	Description	Price
		Total Parts	

Labor Required			
Service Description	Hours	Labor Rate	Charge
		Total Labor	

Other/Supplies Required			
Qty.	Item No.	Description	Price
		Towing	
		Environmental Fees	
		Supplies	
		Total Other/Supplies	

Repair Total	
Total Parts	$
Total Labor	$
Total Other/Supplies	$
Subtotal	$
Tax	$
Total Amount Due ►	$

Repair Summary - Correction to Problem

Signed_____

Date_____

Name_____ Class_____ Date_____ Score_____

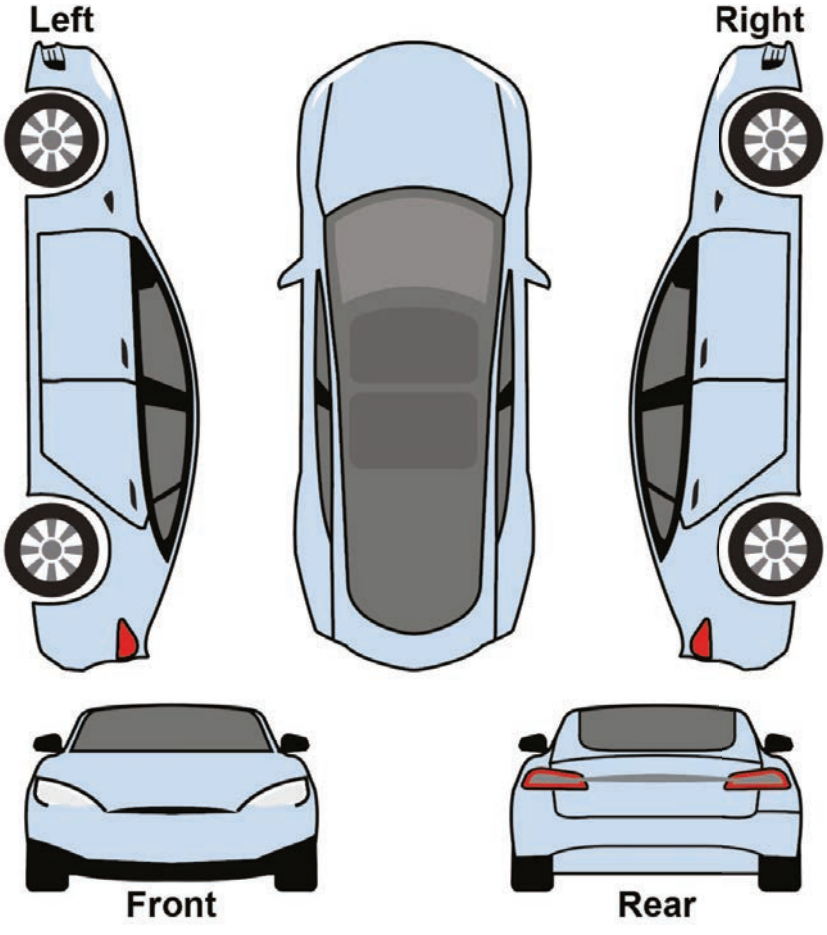
Appendix I - Vehicle Walk-Around Inspection Form

Model Year	Make	Model	Trim Level	Vehicle Identification Number (VIN)	License Plate

Engine/e-Motor	Drivetrain	Odometer
❑ICE (Size____) ❑EV ❑Hybrid ❑Other_____	❑FWD ❑RWD ❑4WD ❑AWD	

Instructions - Preparing for Vehicle Service and Return to Customer

1. Use vehicle protection, such as: fender covers, mats, seat covers, and steering wheel covers as required.
2. Begin visual inspection at the driver's door, working back toward the rear and around to the passenger side.
3. Look for signs of collision damage or repair. Use the "damage type codes" and mark on the diagram any damage to the paint, body, lights, wheels, trim, and glass.
4. Complete the inspection, adding comments and details as needed.
5. Identify ADAS component locations and mark them on the diagram. Note if components are damaged or dirty.
6. Check the bottom corner of windows for a label that identifies glass type: laminated (multilayer - difficult to break) or tempered (made breakable for an emergency). Mark tempered windows for customer safety reference.
7. After inspection and/or service, prepare the vehicle to return to the customer following your shop procedure.



Comments/Details

Name_____ Class_____ Date_____ Score_____

Appendix J - Multi-Point Vehicle Inspection Form

Model Year	Make	Model	Trim Level	Vehicle Identification Number (VIN)	License Plate

Engine/e-Motor	Preparing for Vehicle Service and Return to Customer	
❑ICE (Size____) ❑EV ❑Hybrid ❑Other _____	❑Vehicle Protection	❑Walk-Around Inspection

☑ Satisfactory ☑ May Need Future Attention ☑ Requires Immediate Attention ☐☐☐ Not Applicable

Brakes and Tires

Left Front	❑❑❑ _____ mm	Brake Lining	_____ mm ❑❑❑	Right Front
	❑❑❑ _____ psi	Tire Pressure	_____ psi ❑❑❑	
	❑❑❑ ___ /32nds	Tread Depth	___ /32nds ❑❑❑	
Front Tire Size (Placard) ____/____R____		Actual Size ____/____R____		
Left Rear	❑❑❑ _____ mm	Brake Lining	_____ mm ❑❑❑	Right Rear
	❑❑❑ _____ psi	Tire Pressure	_____ psi ❑❑❑	
	❑❑❑ ___ /32nds	Tread Depth	___ /32nds ❑❑❑	
Rear Tire Size (Placard) ____/____R____		Actual Size ____/____R____		

Tread Wear ❑ Normal ❑ Edge ❑ Center ❑ Cupped ❑ Cut ❑ Feathered

Tire Age in Years ❑ 0-3 ❑ 4-6 ❑ 7+ | Spare Tire ___ /32nds ___ psi

Under Vehicle (Visual)

❑❑❑	Brake Lines/Hoses
❑❑❑	CV Axles/Boots
❑❑❑	Leaks
❑❑❑	Muffler/Exhaust
❑❑❑	Parking Brake Cable
❑❑❑	Shock Absorbers
❑❑❑	Steering Linkage
❑❑❑	Struts/Suspension
❑❑❑	Tie Rod Ends/Boots
❑❑❑	Other _____

Fluids/e-Fluids

Type	Engine Oil	Coolant/ e-Thermal	Power Steering	Brake	Clutch	Trans./ e-Trans.	Differential	Washer
Condition	❑❑❑	❑❑❑	❑❑❑	❑❑❑	❑❑❑	❑❑❑	❑❑❑	❑❑❑
Leak	❑	❑	❑	❑	❑	❑	❑	❑
Level	❑❑❑	❑❑❑	❑❑❑	❑❑❑	❑❑❑	❑❑❑	❑❑❑	❑❑❑

Battery (12-Volt)

❑ Good ❑ Replace

CCA ____ | CA _____ | BCI_____

❑❑❑	Battery Condition
❑❑❑	Hold-Down/Box
❑❑❑	Terminals/Cables

Battery Age _____ Years

Under Hood

❑❑❑	A/C Hoses
❑❑❑	Belt Tensioner
❑❑❑	Drive Belts
❑❑❑	Engine Air Filter
❑❑❑	HEPA/Other Air Filter
❑❑❑	Radiator/Radiator Cap
❑❑❑	Radiator/Heater Hoses
❑❑❑	Other _____

Wipers

Front	Rear	
❑❑❑	❑❑❑	Spray Function
❑❑❑	❑❑❑	Wiper and Blade

ADAS Components(Sensors/Etc.)

❑❑❑	Cameras
❑❑❑	Lidar Sensors
❑❑❑	Radar Sensors
❑❑❑	Ultrasonic Sensors

Vehicle Interior

❑❑❑	Cabin Filter
❑❑❑	Dome Lights
❑❑❑	Heat/Cool Seats
❑❑❑	Horn
❑❑❑	HVAC/Blower
❑❑❑	Parking Brake
❑❑❑	Power Functions
❑❑❑	Other _____

Exterior Lights

Left	Right	
❑❑❑	❑❑❑	Brake Lights
❑❑❑	❑❑❑	Daytime Running
❑❑❑	❑❑❑	Hazard Warning
❑❑❑	❑❑❑	Headlights High Beam
❑❑❑	❑❑❑	Headlights Low Beam
❑❑❑	❑❑❑	Parking Lights
❑❑❑	❑❑❑	Taillights
❑❑❑	❑❑❑	Turn Signals
❑❑❑		License Plate Light
❑❑❑		Third/High Mount Brake

Dash Warning Lights

❑	No Active Warnings
❑	ABS/Brakes
❑	Airbag/SRS
❑	Battery
❑	Check Engine
❑	Engine Temp
❑	Oil Pressure
❑	Power Steering
❑	TPMS
❑	Transmission Temp
❑	Other _____

ADAS Warning Lights

❑	No Active Warnings
❑	Adaptive Cruise Control
❑	Adaptive Headlights
❑	Blind Spot Detection
❑	EV External Sound
❑	Front Collision Alert
❑	Lane Departure Alert
❑	Master Alert
❑	Parking Assist
❑	Rear Collision Alert
❑	Other _____

This is a partial list of inspection items, please consult the owner's manual for specific requirements.

Appendix K - Sample Lesson Plan

Stage 1 - Desired Results (What should students know, understand, and be able to do?)		
Goals	**Transfer**	
	Students will be able to independently use their learning to…	
	Meaning	
	UNDERSTANDINGS *Students will understand that…*	**ESSENTIAL QUESTIONS**
	Acquisition	
	Students will know…	*Students will be skilled at…*

Stage 2 - Evidence (What is the evidence that students understand?)	
Evaluation Criteria	**Assessment Evidence**
PERFORMANCE TASK(S):	**PERFORMANCE TASK(S):**
OTHER EVIDENCE:	**OTHER EVIDENCE:**

Stage 3 - Learning Plan
(What instructional method makes the most sense to support the desired learning?)

Summary of Key Learning Events and Instruction

Warm-Up:

Review:

Assignments and Activities:
Students will…

Closure/Summary:

Reflection and Self Evaluation
(What worked, what didn't? What should I change? Notes for next time.)

Appendix L - Rubrics

Activity Rubric				
Outstanding (A = 4.0)	**Very Good (B = 3.0)**	**Acceptable (C = 2.0)**	**Attempted (D = 1.0)**	**Did Not Attempt (F = 0)**
Student demonstrated a complete understanding of the activity. Student followed all safety rules and procedures. Responses were complete and extremely well organized. Handwriting was very legible.	Student demonstrated a considerable understanding of the activity. Student followed most safety rules and procedures. Responses were presented in a thoughtful manner. Handwriting was legible.	Student demonstrated a partial understanding of the activity. Student followed most safety rules and procedures. Responses were somewhat organized, but they were not fully complete. Handwriting was legible.	Student demonstrated little understanding of the activity. Student missed some safety rules and procedures that could have resulted in an injury. Responses were difficult to follow and confusing to the reader. However, the student made an honest attempt at completing the activity. Handwriting was somewhat illegible.	No attempt was made to complete the activity or handwriting was illegible.

Readability Worksheet Rubric				
Outstanding (A = 4.0)	**Very Good (B = 3.0)**	**Acceptable (C = 2.0)**	**Attempted (D = 1.0)**	**Did Not Attempt (F = 0)**
Student filled in all of the blank lines with the correct content from the textbook. Handwriting was very legible.	Student filled in most of the blank lines with correct content from the textbook. Handwriting was legible.	Student filled in many of the blank lines, but a few were incorrect. Handwriting was legible.	Student attempted to fill in some of the blank lines, however most were incorrect. Handwriting was somewhat illegible.	No attempt was made to complete the worksheet or handwriting was illegible.

Daily Reflection Log Rubric				
Outstanding (A = 4.0)	**Very Good (B = 3.0)**	**Acceptable (C = 2.0)**	**Attempted (D = 1.0)**	**Did Not Attempt (F = 0)**
Student wrote complete sentences and fully reflected on what was learned for the day. Thorough details and examples were given. The log was extremely well organized. Handwriting was very legible.	Student wrote sentences that were mostly complete. Many details and examples were given. The log was presented in a thoughtful manner. Handwriting was legible.	Student wrote sentences that were somewhat complete. Some details and examples were given. The log was somewhat organized, but did not have smooth transitions. Handwriting was legible.	Student wrote many incomplete sentences. Details and examples were not relevant or not given. The log was difficult to follow and confusing to the reader. However, the student made an honest attempt at completing the log. Handwriting was somewhat illegible.	No attempt was made to complete the log or handwriting was illegible.

Article, Website, or Video Review Form Rubric				
Outstanding (A = 4.0)	**Very Good (B = 3.0)**	**Acceptable (C = 2.0)**	**Attempted (D = 1.0)**	**Did Not Attempt (F = 0)**
Student wrote complete sentences and fully reflected on the article, website, or video. The form was filled out completely and was extremely well organized. Handwriting was very legible.	Student wrote sentences that were mostly complete and reflected on the article, website, or video. The form was mostly filled out and responses were presented in a thoughtful manner. Handwriting was legible.	Student wrote sentences that were somewhat complete and briefly reflected on the article, website, or video. The form responses were somewhat organized, but did not have smooth transitions. Handwriting was legible.	Student wrote many incomplete sentences. Form responses were not relevant or not given. It is not clear if the student spent the necessary time to read the article, visit the website, or watch the video. The form responses were difficult to follow and confusing to the reader. However, the student made an honest attempt at completing the form. Handwriting was somewhat illegible.	No attempt was made to complete the form or handwriting was illegible.

Study Questions Rubric				
Outstanding (A = 4.0)	**Very Good (B = 3.0)**	**Acceptable (C = 2.0)**	**Attempted (D = 1.0)**	**Did Not Attempt (F = 0)**
Student answered all of the questions correctly. Handwriting was very legible.	Student answered most of the questions correctly. Handwriting was legible.	Student answered many of the questions, but several were incorrect. Handwriting was legible.	Student made an honest attempt at answering the questions, but most were incorrect. Handwriting was somewhat illegible.	No attempt was made to complete the questions or handwriting was illegible.

Self-Assessment Form Rubric				
Outstanding (A = 4.0)	**Very Good (B = 3.0)**	**Acceptable (C = 2.0)**	**Attempted (D = 1.0)**	**Did Not Attempt (F = 0)**
Student wrote complete sentences and fully reflected on their strengths, areas of improvement, values, goals, and achievements. The form was filled out completely and was extremely well organized. Handwriting was very legible.	Student wrote sentences that were mostly complete. Many strengths, areas of improvement, values, goals, and achievements were given. The form was mostly filled out and responses were presented in a thoughtful manner. Handwriting was legible.	Student had some partial sentences. Some strengths, areas of improvement, values, goals, and achievements were given. Form responses were somewhat organized, but they were not fully complete. Handwriting was legible.	Student had many incomplete sentences. Few strengths, areas of improvement, values, goals, and achievements were given. The form was difficult to follow and confusing to the reader. However, the student made an honest attempt at completing the form. Handwriting was somewhat illegible.	No attempt was made to complete the form or handwriting was illegible.

Career Exploration Form Rubric				
Outstanding (A = 4.0)	**Very Good (B = 3.0)**	**Acceptable (C = 2.0)**	**Attempted (D = 1.0)**	**Did Not Attempt (F = 0)**
Student wrote complete sentences and fully identified the career, salary potential, education/ training required, job outlook, nature of the work, working conditions, and the reason they chose the career. The research was thorough. The form was extremely well organized. Handwriting was very legible.	Student wrote sentences that were mostly complete. One of the responses was missing from the career, salary potential, education/training required, job outlook, nature of the work, working conditions, and the reason they chose the career. The form was mostly filled out and the responses that were presented were in a thoughtful manner. Handwriting was legible.	Student wrote some partial sentences. Two or more of the responses were missing from the career, salary potential, education/training required, job outlook, nature of the work, working conditions, and the reason they chose the career. Form responses were somewhat organized, but they were not fully complete. Handwriting was legible.	Student had few complete sentences. Little research was completed, with most of the responses missing from the career, salary potential, education/training required, job outlook, nature of the work, working conditions, and the reason they chose the career. The form was difficult to follow and confusing to the reader. However, the student made an honest attempt at completing the form. Handwriting was somewhat illegible.	No attempt was made to complete the form or handwriting was illegible.

Active Participation Rubric				
Outstanding (A = 4.0)	**Very Good (B = 3.0)**	**Acceptable (C = 2.0)**	**Attempted (D = 1.0)**	**Did Not Attempt (F = 0)**
Student regularly attended class on time. Student was always prepared for class by reading the assigned materials and completing all assignments, motivated to accomplish the task at hand. Student consistently contributed to discussions with original thoughts and perspectives, adding relevant information to the class topic. Student listened attentively all the time, without interrupting.	Student usually attended class on time. Student was generally prepared for class by reading the assigned materials and completing most of the assignments, motivated to accomplish the task at hand. Student often contributed to discussions with original thoughts and perspectives, adding relevant information to the class topic. Student listened attentively most of the time, without interrupting.	Student usually attended class on time. Student was generally prepared for class by reading the assigned materials and completing assignments, motivated to accomplish the task at hand. Student sometimes contributed to discussions with original thoughts and perspectives, adding relevant information to the class topic. Student listened attentively some of the time, without interrupting.	Student sometimes attended class on time. Student was occasionally prepared for class by reading the assigned materials and completing assignments. Student was rarely motivated to accomplish the task at hand. Student infrequently contributed to discussions with original thoughts and perspectives, adding little relevant information to the class topic. Student seldom listened attentively, without interrupting.	Few or no attempts were made to attend class on time or to prepare for class by reading the assigned materials and completing assignments. Student was not motivated to accomplish the task at hand. Student rarely or never contributed to discussions with original thoughts and perspectives. Student rarely listened attentively, often interrupting others.

Workplace Skills Rubric				
Outstanding (A = 4.0)	**Very Good (B = 3.0)**	**Acceptable (C = 2.0)**	**Attempted (D = 1.0)**	**Did Not Attempt (F = 0)**
Student consistently maintained personal standards expected for the workplace, including but not limited to being on time, dressing appropriately, and demonstrating honesty integrity, and reliability. The student always exhibited professional work habits/ethics, including but not limited to complying with workplace/school policies, negotiating solutions to conflicts, following directions, being respectful of tools and property, and contributing to an inclusive environment.	Student usually maintained personal standards expected for the workplace, including but not limited to being on time, dressing appropriately, and demonstrating honesty integrity, and reliability. The student mostly exhibited professional work habits/ethics, including but not limited to complying with workplace/school policies, negotiating solutions to conflicts, following directions, being respectful of tools and property, and contributing to an inclusive environment.	Student generally maintained personal standards expected for the workplace, including but not limited to being on time, dressing appropriately, and demonstrating honesty integrity, and reliability. The student normally exhibited professional work habits/ethics, including but not limited to complying with workplace/school policies, negotiating solutions to conflicts, following directions, being respectful of tools and property, and contributing to an inclusive environment.	Student sometimes maintained personal standards expected for the workplace, including but not limited to being on time, dressing appropriately, and demonstrating honesty integrity, and reliability. The student seldom exhibited professional work habits/ethics, including but not limited to complying with workplace/school policies, negotiating solutions to conflicts, following directions, being respectful of tools and property, and contributing to an inclusive environment.	Few or no attempts were made to maintain personal standards expected for the workplace, including but not limited to being on time, dressing appropriately, and demonstrating honesty integrity, and reliability. The student rarely exhibited professional work habits/ethics, including but not limited to complying with workplace/school policies, negotiating solutions to conflicts, following directions, being respectful of tools and property, and contributing to an inclusive environment.

Test Rubric				
Outstanding (A = 4.0)	**Very Good (B = 3.0)**	**Acceptable (C = 2.0)**	**Attempted (D = 1.0)**	**Did Not Attempt (F = 0)**
Selected Response/ ASE Style Questions: Student answered 90% or more of the questions correctly. **Constructed Response Questions:** Student demonstrated a complete understanding of the problem. Several details and examples were given to support the answer. The response was extremely well organized. Handwriting was very legible.	**Selected Response/ ASE Style Questions:** Student answered 80% or more of the questions correctly. **Constructed Response Questions:** Student demonstrated a considerable understanding of the problem. Some details and examples were given to support the answer. The response was presented in a thoughtful manner. Handwriting was legible.	**Selected Response/ ASE Style Questions:** Student answered 70% or more of the questions correctly. **Constructed Response Questions:** Student demonstrated a partial understanding of the problem. Few details and examples were given to support the answer. The response was somewhat organized, but did not have smooth transitions. Handwriting was legible.	**Selected Response/ ASE Style Questions:** Student answered 60% or more of the questions correctly. **Constructed Response Questions:** Student demonstrated little understanding of the problem. Details and examples were not relevant or not given. The response was difficult to follow and confusing to the reader. However, the student made an honest attempt at answering the question. Handwriting was somewhat illegible.	**Selected Response/ ASE Style Questions:** Student answered less than 60% of the questions correctly. **Constructed Response Questions:** No attempt was made to answer the question or handwriting was illegible.

Appendix M - Tools and Supplies List

The following is a compilation of the recommended tools and supplies needed to complete activities. Visit **www.AutoUpkeep.com/tools-and-supplies** to find suggested products.

Chapter 1

Introduction and How Cars Work

Workplace Skills Activity
Tools: None
Supplies: None

Car Identification and Preparing for Vehicle Service Activity
Tools: None
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I)

Owner's Manual Activity
Tools: Internet access
Supplies: *Vehicle protection supplies, Vehicle Walk-Around Inspection Form* (Appendix I)

Chapter 2

Buying an Automobile

Towing and Hauling Activity
Tools: Internet access, calculator
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I)

Advanced Driver Assistance Systems (ADAS) Activity
Tools: Internet access
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I)

Buying a New Automobile Activity
Tools: Internet access, calculator
Supplies: None

Buying a Used Automobile Activity
Tools: Internet access
Supplies: None

Chapter 3

Automotive Expenses

Automotive Expenses Activity
Tools: Internet access, calculator
Supplies: None

Chapter 4

Repair Facilities

Repair Facilities Activity
Tools: Internet access
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), *Multi-Point Vehicle Inspection Form* (Appendix J), *Work Order/Repair Invoice* (Appendix H)

Chapter 5

Safety Around the Automobile

Automotive Safety Activity
Tools: None
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I)

Safety Data Sheet (SDS) Activity
Tools: Internet access
Supplies: None

Personal Protection Equipment (PPE) and Fire Safety Activity
Tools: Internet access
Supplies: None

CHAPTER 6

Tools, Fasteners, and Equipment

Tools and Equipment Activity
Tools: A variety of tools for identification
Supplies: None

Fasteners Activity
Tools: Thread pitch gauge, extractor set, tap and die set, thread repair insert kit
Supplies: A variety of fasteners

Service Manual Activity
Tools: Internet access
Supplies: None

CHAPTER 7

Auto Care and Cleaning

Interior Cleaning Activity
Tools: Vacuum, bucket
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), detail towels, shop rags, chemical resistant gloves, car wash soap (environmentally safe), cotton swabs, auto glass cleaner, vinyl cleaner, fabric cleaner, lint-free cloths, multipurpose cleaner, water

Exterior Cleaning Activity
Tools: Hose with spray nozzle, bucket, chamois or microfiber towel, wash mitt, tire scrub brush
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), car wash soap (environmentally safe), whitewall/blackwall cleaner, shop rags, water

Waxing Activity
Tools: None
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), detail towels, wax applicator or cloth, automotive wax, bug and tar remover, auto glass cleaner, lint-free cloths

CHAPTER 8

Fluid Level Check

Fluid Level Check Activity

Tools: Safety goggles, chemical resistant gloves, basic hand tools, fender cover
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, correct type and amount of fluids needed, distilled water (if needed)

CHAPTER 9

Electrical System

Ohm's Law Activity
Tools: Internet access
Supplies: None

Circuit Construction Simulator Activity
Tools: Internet access
Supplies: None

Simple Circuits Activity
Tools: Safety glasses, digital multimeter (DMM)
Supplies: Power source (batteries), battery holder, insulated wires, switch, light bulb, light bulb socket, resistor, electrical tape, OR a simple circuit kit

Voltage Drop Activity
Tools: None
Supplies: None

Wiring Diagram Activity
Tools: Internet access
Supplies: None

Battery Activity

Tools: Internet access, safety goggles, chemical resistant gloves, respirator, basic hand tools, digital multimeter (DMM), battery load tester, battery hydrometer, wire brush, battery terminal cleaner, battery post spreader, battery terminal puller, parts cleaning brush, mixing cup, fender cover
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, baking soda, anti-corrosion spray, distilled water, water

Charging Activity
Tools: Internet access, safety glasses, basic hand tools, digital multimeter (DMM), current clamp, fender cover
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags

Starting Activity
Tools: Safety glasses, basic hand tools, digital multimeter (DMM), current clamp, fender cover, wheel chocks, and lifting tools (drive-on ramps or jack with jack stands) or an automotive lift
Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags

CHAPTER 10

Lubrication System

Oil and Filter Change Activity

Tools: Safety glasses, basic hand tools, wrench for oil plug, oil filter wrench, oil drain pan, funnel, fender cover, wheel chocks, and lifting tools (drive-on ramps or jack with jack stands) or an automotive lift

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, chemical resistant gloves, correct type and amount of oil, oil filter

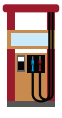
CHAPTER 11

Fuel System

Fuel System Part Identification Activity

Tools: Internet access

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I)



Fuel System Maintenance Activity

Tools: Safety glasses, safety goggles, basic hand tools, vacuum, drain pan, fender cover, wheel chocks, and lifting tools (drive-on ramps or jack with jack stands) or an automotive lift

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, replacement parts (e.g., air filter, PCV valve, fuel filter) specific to your vehicle

CHAPTER 12

Cooling System and Climate Control

Air Conditioning Activity

Tools: Safety glasses, garden hose, dull object for probe, infrared thermometer, fender cover

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), water

Cabin Air Filter Activity

Tools: Safety glasses, vacuum, basic hand tools

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), new cabin air filter(s) for vehicle, vacuum, shop rag, towel

Cooling System Activity

Tools: Safety glasses, basic hand tools, funnel, garden hose, coolant tester, candy thermometer, portable electric burner, pan, piece of wire, fender cover

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, antifreeze (coolant), test thermostat, coolant test strips, distilled water

CHAPTER 13

Ignition System

Ignition System Activity

Tools: Safety glasses, basic hand tools, ratchet, spark plug socket, spark plug gap gauge, spark plug wire boot puller, fender cover, DMM, vacuum

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, spark plugs, COP boots (if applicable), distributor cap and rotor (if applicable), spark plug wires (if desired to change), anti-seize compound, dielectric grease

Chapter 14

Suspension, Steering, and Tires

Suspension and Steering Activity

Tools: Safety glasses, grease gun, fender cover, wheel chocks, and lifting tools (drive-on ramps or jack with jack stands) or an automotive lift

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, chassis grease

Tire Inspection and Rotation Activity

Tools: Safety glasses, tread depth gauge, tire pressure gauge, lug wrench (manual, pneumatic, or electric), torque wrench, basic hand tools, air compressor, TPMS tool, wheel chocks, and lifting tools (jack with jack stands) or an automotive lift

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, anti-seize compound

Choosing the Right Tires Activity

Tools: Internet access, calculator, a spread-sheet program such as Microsoft Excel, Apple Numbers, or Google Sheets

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I)

Chapter 15

Braking System

Brake Inspection Activity

Tools: Safety glasses, basic hand tools, torque wrench, ruler (or brake pad thickness gauge), fender cover, wheel chocks, and lifting tools (jack with jack stands) or an automotive lift

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, anti-seize compound, correct type and amount of brake fluid, brake fluid test strips

Chapter 16

Drivetrain

Drivetrain Activity

Tools: Safety glasses, basic hand tools, grease gun, fender cover, wheel chocks, and lifting tools (drive-on ramps or jack with jack stands) or an automotive lift

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, grease, transmission fluid, differential fluid (if needed)

Chapter 17

Exhaust and Emission System

Exhaust and Emission Activity

Tools: Safety glasses, hammer, fender cover, wheel chocks, and lifting tools (drive-on ramps or jack with jack stands) or an automotive lift

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags

Chapter 18

Alternative Fuels and Designs

Payback Period Activity

Tools: Internet access, calculator

Supplies: None

Future Vehicle Activity

Tools: Internet access

Supplies: None

Chapter 19

Automotive Accessories

Automotive Accessories Activity

Tools: Internet access, calculator

Supplies: None

CHAPTER 20

Common Problems and Roadside Emergencies

Changing a Flat Tire Activity

Tools: Torque wrench, wheel chocks, tools in the vehicle (e.g., jack, lug wrench), work gloves

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, anti-seize compound

Jump-Starting Activity

Tools: Safety goggles, chemical resistant gloves, fender cover, jumper cables, portable jump starter, tape measure

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, distilled water (if needed)

Lighting Activity

Tools: Safety glasses, basic hand tools, test light, digital multimeter (DMM), screwdriver set, nut driver set, fender cover, wire stripper, soldering iron kit, soldering station

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), shop rags, dielectric grease, replacement lights, jumper wire materials

Replacing Wipers Activity

Tools: Safety glasses, flat-head screwdriver, basic hand tools

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I), new wiper blades, windshield washer fluid

On-Board Diagnostics Activity

Tools: Safety glasses, OBD II scan tool, Internet access

Supplies: Vehicle protection supplies, *Vehicle Walk-Around Inspection Form* (Appendix I)

CHAPTER 21

Electric Vehicles

Electric Vehicles Activity

Tools: Internet access, calculator, a spread-sheet program such as Microsoft Excel, Apple Numbers, or Google Sheets

Supplies: None

CHAPTER 22

Next-Generation Vehicles

ADAS and Vehicle Automation Level Identification Activity

Tools: Internet access

Supplies: None

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ASE Maintenance and Light Repair (MLR) Tasks

ASE Task Priority

Priority Level 1 (P-1)	Priority Level 2 (P-2)	Priority Level 3 (P-3)

For every task, the following safety requirement must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

FOUNDATIONAL TASKS - REQUIRED 2024

Shop and Personal Safety

1. Identify general lab/shop safety rules and procedures. CH 5
2. Utilize safe procedures for handling of tools and equipment. CH 6
3. Identify and use proper placement of floor jacks and jack stands. CH 5, CH 20
4. Identify and use proper procedures for safe lift operation, ensuring the configuration and weight rating of the lift is appropriate for the vehicle being lifted, including xEVs. CH 5
5. Utilize proper ventilation procedures for working within the lab/shop area. CH 5
6. Identify marked safety areas. CH 5
7. Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. CH 5
8. Identify the location and use of eye wash stations. CH 5
9. Identify the location of the posted evacuation routes. CH 5
10. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities. CH 5
11. Identify and wear appropriate clothing for lab/shop activities. CH 5
12. Secure hair and jewelry for lab/shop activities. CH 5
13. Identify vehicle systems which pose a safety hazard during service such as: supplemental restraint systems (SRS), electronic brake control systems, stop/start systems, and remote start systems. CH 1, CH 5
14. Identify vehicle systems which pose a safety hazard during service due to high voltage such as: xEV drivetrains, lighting systems, ignition systems, A/C systems, injection systems, etc. CH 1, CH 9
15. Locate and demonstrate knowledge of safety data sheets (SDS). CH 5
16. Demonstrate knowledge of personal protective equipment (PPE) required for use in high voltage/electric vehicle circuits. CH 21

xEV Vehicle Safety

1. Demonstrate knowledge of hazards related to high voltage systems/electric vehicles, including electrocution, fire, explosion, arc flash, gases and fumes, hazardous chemicals, and EMF, and how to properly respond to emergency situations. CH 21
2. Demonstrate knowledge of high voltage system and component coloring, warning labels, lights, signage, and lock-out/tag-out procedures. CH 21
3. Demonstrate ability to identify which components and circuits contain high voltage. CH 21

xEV Vehicle Safety . . .

4. Demonstrate knowledge of steps needed to assess possible hazards prior to servicing a high voltage/electric vehicle, including awareness of automatic systems that may operate while the key switch/ignition is off. CH 21
5. Understand limitations on which systems, components, and circuits of a high voltage/electric vehicle a technician is capable of safely servicing based on their level of training and qualification. CH 21
6. Demonstrate knowledge of high voltage/electric vehicle intake process, inspection, handling, and in-process monitoring for all vehicles including damaged/compromised vehicles. CH 21

Tools and Equipment

1. Identify tools and their usage in automotive applications. CH 6
2. Identify standard and metric designation. CH 6
3. Demonstrate safe handling and use of appropriate tools. CH 6
4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. CH 6
5. Demonstrate proper use of precision measuring tools (e.g., micrometer, dial-indicator, dial-caliper). CH 6
6. Perform common fastener and thread repair, including removing broken bolts, restoring internal and external threads, and repairing internal threads with a thread insert. CH 6

Preparing for Vehicle Service

1. Identify information needed and the service requested on a repair order. CH 1, CH 4
2. Identify purpose and demonstrate proper use of vehicle protection such as: fender covers, mats, seat, and steering wheel covers. CH 1, CH 4, CH 7
3. Perform a vehicle walk-around inspection; identify and document existing vehicle conditions such as body damage, paint damage, windshield damage, etc. CH 4
4. Perform a vehicle multi-point inspection and complete a vehicle inspection report (written and/or electronic). CH 4
5. Demonstrate use of the three C's (concern, cause, and correction). CH 4
6. Create a plan of action for each specific service or diagnostic situation, including placing vehicle in service mode as required. CH 4
7. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. CH 4

Preparing Vehicle for Customer

1. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.). CH 1, CH 7

WORKPLACE SKILLS - REQUIRED 2024

Personal Standards

1. Reports to work daily on time; able to take directions and motivated to accomplish the task at hand. — CH 1
2. Dresses appropriately and uses language and manners suitable for the workplace. — CH 1
3. Maintains personal hygiene appropriate for the workplace. — CH 1
4. Meets and maintains employment eligibility criteria, such as drug/alcohol-free status, clean driving record, etc. — CH 1
5. Demonstrates honesty, integrity, and reliability. — CH 1

Work Habits/Ethics

1. Complies with workplace policies/laws. — CH 1
2. Contributes to the success of the team, assists others and requests help when needed. — CH 1
3. Works well with all customers and coworkers. — CH 1
4. Negotiates solutions to interpersonal and workplace conflicts. — CH 1
5. Contributes ideas and initiative. — CH 1, CH 18

Work Habits/Ethics . . .

6. Follows directions. — CH 1
7. Communicates effectively, both in writing and verbally, with customers and coworkers. — CH 1, CH 18
8. Reads and interprets workplace documents; writes clearly and concisely. — CH 1
9. Analyzes and resolves problems that arise in completing assigned tasks. — CH 1
10. Organizes and implements a productive plan of work. — CH 1
11. Uses scientific, technical, engineering and mathematics (STEM) principles and reasoning to accomplish assigned tasks. — CH 1, CH 2, CH 3, CH 18, CH 19
12. Identifies and addresses the needs of all customers, providing helpful, courteous, and knowledgeable service and advice as needed. — CH 1
13. Respectful of tools and property used in school and workplace environment. — CH 1
14. Contributes to an inclusive environment where every coworker and customer feels welcomed, heard, and valued. — CH 1, CH 18

I. ENGINE REPAIR - MLR 2024

A. General

1. Research vehicle service information such as fluid type, internal combustion engine operation, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS). — P-1 — CH 2, CH 6, CH 8, CH 10
2. Retrieve and record DTCs, OBD monitor status, and freeze frame data; clear codes and data when directed. — P-1 — CH 20
3. Verify operation of the instrument panel engine warning indicators. — P-1 — CH 20
4. Inspect engine assembly for fuel, oil, coolant, and other leaks. — P-1 — CH 8
5. Install engine covers using gaskets, seals, and sealers as required. — P-2
6. Demonstrate knowledge of the procedure for verifying engine mechanical timing. — P-2
7. Inspect engine mounts. — P-2
8. Identify service precautions related to service of the internal combustion engine of an xEV. — P-2 — CH 18

B. Cylinder Head and Valve Train

1. Identify cylinder head and valve train components and configurations. — P-1 — CH 1

C. Engine Block Assembly

1. Identify engine block assembly components and configurations. — P-1 — CH 1

D. Lubrication and Cooling Systems

1. Identify lubrication and cooling system components and configurations. — P-1 — CH 8, CH 10, CH 12
2. Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required. — P-1 — CH 10
3. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant reservoir/recovery tank, heater core, and galley plugs. — P-1 — CH 8, CH 12
4. Identify causes of engine overheating. — P-2 — CH 12, CH 20
5. Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. — P-1 — CH 8, CH 9
6. Inspect and test coolant; drain and recover coolant; flush and/or refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. — P-1 — CH 12
7. Identify different types of water/coolant pumps (belt driven, chain driven, and electric). — P-2 — CH 12
8. Remove, inspect, and replace thermostat and gasket/seal. — P-1 — CH 12

II. AUTOMATIC TRANSMISSION AND TRANSAXLE - MLR 2024

A. General

1. Research vehicle service information such as fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS).	P-1	CH 2, CH 6, CH 8, CH 16
2. Identify automatic transmission and transaxle components and configurations, including torque converter automatic, dual-clutch automatic (DCT), CVT, and xEV drive.	P-1	CH 8, CH 16
3. Retrieve and record on-board diagnostic DTCs, monitor status, and freeze frame data; clear codes and data when directed.	P-1	CH 20
4. Inspect transmission fluid condition; check fluid level; inspect for leaks on transmission or transaxle equipped with a dipstick.	P-1	CH 8, CH 16
5. Demonstrate knowledge of procedures to check transmission fluid condition and level; inspect for leaks on transmission or transaxle not equipped with a dipstick.	P-1	
6. Demonstrate knowledge of transmission/transaxle gear reduction/multiplication operation using driving, driven, and held member (power flow) principles.	P-3	
7. Demonstrate knowledge of hydraulic principles (Pascal's Law) in a transmission/transaxle.	P-3	

B. In-Vehicle Transmission/Transaxle

1. Inspect external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch.	P-2	
2. Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification.	P-1	CH 8
3. Demonstrate knowledge of relearn procedures.	P-2	
4. Inspect, replace and/or align power train mounts.	P-3	

C. Off-Vehicle Transmission and Transaxle

1. Describe the operational characteristics of a continuously variable transmission (CVT).	P-3	CH 16
2. Describe the operational characteristics of a hybrid vehicle drive train.	P-3	CH 18
3. Describe the operational characteristics of dual-clutch transmission (DCT).	P-3	

III. MANUAL DRIVE TRAIN AND AXLES - MLR 2024

A. General

1. Research vehicle service information such as fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS).	P-1	CH 2, CH 6, CH 8, CH 16
2. Identify manual drive train and axle components and configurations.	P-1	CH 8, CH 16
3. Retrieve and record on-board diagnostic DTCs, monitor status, and freeze frame data; clear codes and data when directed.	P-2	CH 20
4. Check fluid condition; check for leaks.	P-3	CH 8, CH 16
5. Drain and refill manual transmission/transaxle; use proper fluid type per manufacturer specification.	P-2	CH 8, CH 16

B. Clutch

1. Demonstrate knowledge of procedures to check and adjust clutch primary cylinder fluid level.	P-3	CH 8, CH 16

C. Drive Shaft, Half Shafts, Universal Joints and Constant-Velocity (CV) Joints (Front, Rear, All, and Four-wheel Drive)

1. Inspect and/or remove/replace bearings, hubs, and seals.	P-2	
2. Inspect and/or service/replace shafts, yokes, boots, and universal/CV joints.	P-2	CH 16

D. Differential and Drive Axles
D.1 Ring and Pinion Gears and Differential Housing Assembly

1. Inspect differential housing; check for leaks; inspect housing vent.	P-1	CH 8, CH 16
2. Check and adjust differential housing fluid level; use proper fluid type per manufacturer specification.	P-1	CH 8, CH 16
3. Drain and refill differential housing; using proper fluid type per manufacturer specification.	P-1	

D. Differential and Drive Axles
D.2 Drive Axles

1. Inspect and replace drive axle wheel studs.	P-2	CH 14

E. Four-wheel Drive/All-wheel Drive

1. Identify concerns related to variations in tire circumference and/or final drive ratios.	P-3	
2. Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification.	P-2	CH 16

IV. SUSPENSION AND STEERING - MLR 2024

A. General

1.	Research vehicle service information such as fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS).	P-1	CH 2, CH 6, CH 8, CH 14, CH 20
2.	Identify suspension and steering system components and configurations.	P-1	CH 14
3.	Retrieve and record on-board diagnostic DTCs, monitor status, and freeze frame data; clear codes and data when directed.	P-1	CH 20
4.	Disable, enable, and properly handle SRS/airbag system components during vehicle service following manufacturers' procedures.	P-2	

B. Steering System

1.	Inspect rack and pinion steering gear tie rod ends (sockets) and bellows boots.	P-1	CH 14
2.	Inspect power steering fluid level and condition.	P-2	CH 8, CH 14
3.	Drain and replace power steering system fluid; use proper fluid type per manufacturer specification.	P-2	CH 14
4.	Inspect for power steering fluid leakage.	P-2	CH 8, CH 14
5.	Remove, inspect, replace, and/or adjust power steering pump drive belt.	P-2	CH 14
6.	Inspect, remove, and/or replace power steering hoses and fittings.	P-2	CH 14
7.	Inspect pitman arm, relay (centerlink/ intermediate) rod, idler arm, mountings, and steering linkage damper.	P-3	CH 14
8.	Inspect tie rod ends (sockets), tie rod sleeves, and clamps (non-rack and pinion).	P-3	CH 14
9.	Demonstrate knowledge of electric power steering system operation.	P-2	CH 14

C. Suspension System

1.	Inspect upper and/or lower control arms, bushings, and shafts.	P-2	CH 14
2.	Inspect and replace rebound/jounce bumpers.	P-3	CH 14
3.	Inspect track bar, strut rods/radius arms, and related mounts and bushings.	P-2	CH 14
4.	Inspect upper and/or lower ball joints (with or without wear indicators).	P-2	CH 14
5.	Inspect suspension system coil springs and spring insulators.	P-2	CH 14
6.	Inspect torsion bars and mounts.	P-3	CH 14
7.	Inspect, remove, and/or replace front/ rear stabilizer bar (sway bar) bushings, brackets, and links.	P-2	CH 14
8.	Inspect, remove, and/or replace strut assembly, strut coil spring, insulators, and upper strut bearing mount.	P-2	CH 14
9.	Inspect components of rear suspension systems (coil, leaf, and torsion beams).	P-1	CH 14
10.	Inspect components of electronically controlled suspension systems.	P-2	CH 14

D. Related Suspension and Steering Service

1	Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings.	P-1	CH 14
2.	Inspect front and rear wheel bearings.	P-1	
3.	Describe the function of electronically controlled suspension and steering systems and components, (i.e., active suspension and stability control).	P-2	CH 14

E. Wheel Alignment

1	Determine the need to recalibrate a vehicle's advanced driver assistance system (ADAS) that may require calibration after repairs or adjustments.	P-1	
2	Perform pre-alignment inspection; measure vehicle ride height.	P-1	
3.	Describe four-wheel alignment angles (camber, caster, toe, setback, and thrust angle) and effects on vehicle handling\tire wear.	P-1	CH 14

F. Wheels and Tires

1.	Inspect tire condition/age; identify tire wear patterns; check for correct tire size, application (service-class, load, and speed ratings), and air pressure as listed on the tire information placard/ label.	P-1	CH 14, CH 20
2.	Rotate tires according to manufacturer's recommendations including vehicles equipped with tire pressure monitoring systems (TPMS).	P-1	CH 14
3.	Dismount, inspect, and remount tire on wheel (with/without TPMS); balance wheel and tire assembly.	P-1	CH 14
4.	Inspect tire and wheel assembly for air loss; determine needed action.	P-1	CH 14
5.	Repair tire following tire manufacturer approved procedure.	P-1	CH 14
6.	Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate/ relearn system; verify operation of instrument panel lamps.	P-1	CH 14
7.	Demonstrate knowledge of steps required to remove and replace sensors (per OEM/sensor manufacturer) in a tire pressure monitoring system (TPMS).	P-1	CH 14
8.	Perform Road Force balance/match mounting.	P-3	

V. BRAKES - MLR 2024

A. General

1.	Research vehicle service information such as fluid type, system design (hydraulic, electronic, etc.), vehicle service history, service precautions, technical service bulletins, and recalls including xEV and vehicles equipped with advanced driver assistance systems (ADAS).	P-1 CH 6, CH 8, CH 15
2.	Identify brake system components and configurations.	P-1 CH 15
3.	Retrieve and record on-board diagnostic DTCs, monitor status, and freeze frame data; clear codes and data when directed.	P-1 CH 20
4.	Research the need to place a vehicle in service mode before servicing the brake system.	P-1 CH 15
5.	Research the need to perform calibration/ recalibration, initialization, or relearn procedures as required.	P-1 CH 15
6.	Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS).	P-1 CH 15
7.	Install wheel and torque lug nuts/wheel fasteners.	P-1 CH 14, CH 15

B. Hydraulic System

1.	Demonstrate knowledge of hydraulic principles (Pascal's law).	P-1 CH 15
2.	Describe proper brake pedal height, travel, and feel.	P-1 CH 15
3.	Check primary cylinder for proper operation.	P-1 CH 15
4.	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports.	P-1 CH 15
5.	Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification.	P-1 CH 8
6.	Bleed and/or replace fluid in the brake system.	P-1 CH 15
7.	Test brake fluid for contamination.	P-2 CH 15
8.	Identify components of brake warning light system.	P-2 CH 15

C. Drum Brakes

1.	Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability.	P-2
2.	Refinish brake drum and measure final drum diameter; compare with specification.	P-3
3.	Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/ self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.	P-3
4.	Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.	P-3
5.	Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments.	P-3

D. Disc Brakes

1.	Remove and clean caliper assembly; inspect for leaks, damage, and wear.	P-1 CH 15
2.	Inspect caliper mounting and slides/pins for proper operation, wear, and damage.	P-1 CH 15
3.	Remove, inspect, and/or replace brake pads and retaining hardware.	P-1 CH 15
4.	Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads against rotor; inspect for leaks.	P-1 CH 15
5.	Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout.	P-1 CH 15
6.	Remove and reinstall/replace rotor.	P-1 CH 15
7.	Refinish rotor on vehicle; measure final rotor thickness and compare with specification.	P-3
8.	Refinish rotor off vehicle; measure final rotor thickness and compare with specification.	P-3
9.	Retract and re-adjust caliper piston on an integrated parking brake system.	P-2
10.	Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendation.	P-1 CH 15

E. Power-Assist Units

1	Check brake pedal travel with and without engine running to verify proper power booster operation.	P-2
2.	Identify components of the brake power assist system (vacuum/ hydraulic/electric).	P-2

F. Related Systems (i.e., Wheel Bearings, Parking Brakes, Electrical)

1.	Remove, clean, inspect, repack/replace, and install wheel bearings; remove and install bearing races; replace seals; install hub and adjust bearings.	P-3
2.	Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed.	P-2 CH 15
3.	Check parking brake operation (including electric parking brakes); check parking brake indicator light system operation.	P-2 CH 15
4.	Check operation of brake stop light system.	P-1 CH 15
5.	Inspect and replace wheel studs/fasteners.	P-2 CH 14

G. Electronic Brake Control Systems: Antilock Brake (ABS), Traction Control (TCS) and Electronic Stability Control (ESC) Systems

1.	Identify electronic brake control system components and describe function (ABS, TCS, ESC).	P-2 CH 15
2.	Describe the operation of a regenerative braking system.	P-3 CH 15

VI. ELECTRICAL/ELECTRONIC SYSTEMS - MLR 2024

A. General

1. Research vehicle service information such as fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS).	P-1	CH 2, CH 6, CH 8, CH 9, CH 11, CH 20
2. Identify electrical/electronic system components and configurations.	P-1	CH 9, CH 20, CH 21
3. Retrieve and record on-board diagnostic DTCs, monitor status, and freeze frame data; clear codes and data when directed.	P-1	CH 20
4. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).	P-1	CH 9, CH 20
5. Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance.	P-1	CH 9
6. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.	P-1	CH 9
7. Describe precautions related to the use of test lights.	P-3	CH 20
8. Use fused jumper wires to check operation of electrical circuits per service information.	P-2	CH 20
9. Use wiring diagrams to trace electrical/electronic circuits.	P-1	CH 9
10. Measure key-off battery drain (parasitic draw).	P-2	CH 9
11. Inspect and test fusible links, circuit breakers, and fuses.	P-1	CH 20
12. Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair).	P-2	CH 20
13. Research the need to perform calibration/recalibration, initialization, or relearn procedures as required.	P-1	CH 9

B. Batteries (Low Voltage)

1. Perform battery state-of-charge test; determine needed action.	P-1	CH 9
2. Confirm proper battery capacity, size, type, and application for vehicle; perform battery capacity and load test, as recommended by manufacturer.	P-1	CH 9
3. Maintain or restore electronic memory functions as recommended by manufacturer.	P-2	CH 9
4. Inspect and clean battery; check battery cables, connectors, clamps, and hold-downs.	P-1	CH 8, CH 9
5. Perform battery charging according to manufacturer's recommendations.	P-1	CH 9

B. Batteries (Low Voltage)...

6. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply according to manufacturer's recommendations.	P-1	CH 20
7. Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.	P-2	CH 9

C. Starting System (Low Voltage)

1. Perform starter current draw test.	P-1	CH 9
2. Perform starter circuit voltage drop tests.	P-1	CH 9
3. Inspect and test starter relays and solenoids.	P-2	CH 9
4. Remove and install starter in a vehicle.	P-3	CH 9
5. Inspect and test switches, connectors, and wires of starter control circuits.	P-2	CH 9
6. Demonstrate knowledge of an automatic idle-stop/start-stop system that uses a low-voltage starter to restart the engine.	P-2	CH 18

D. Charging System (Low Voltage)

1. Perform charging system output test.	P-1	CH 9
2. Inspect, adjust, and replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.	P-1	CH 9
3. Remove, inspect, and replace generator (alternator).	P-3	CH 9
4. Perform charging circuit voltage drop tests.	P-2	CH 9

E. Lighting Systems

1. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed.	P-1	CH 20
2. Aim headlights.	P-2	

F. Instrument Cluster and Driver Information Systems

1. Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators as required.	P-1	CH 20

G. Body Electrical Systems

1. Demonstrate knowledge of vehicle comfort, convenience, access, safety, and related systems operation.	P-3	CH 22
2. Remove and reinstall door panel.	P-2	
3. Describe the operation of keyless entry/remote-start systems.	P-3	CH 22
4. Describe disabling and enabling procedures for supplemental restraint system (SRS); verify indicator lamp operation.	P-2	
5. Verify windshield wiper and washer operation; replace wiper blades.	P-1	CH 20

H. xEV Systems

1. Locate procedures to safely de-energize/de-stable and energize/enable high-voltage systems.	P-3	CH 21

VII. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) - MLR 2024

A. General

1.	Research vehicle service information, including refrigerant/oil/fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS).	P-1	CH 1, CH 12
2.	Identify heating, ventilation, and air conditioning (HVAC) components and configurations.	P-1	CH 12
3.	Retrieve and record on-board diagnostic DTCs, monitor status, and freeze frame data; clear codes and data when directed.	P-1	CH 20
4.	Demonstrate knowledge of the steps of an A/C performance test, as recommended by manufacturer.	P-2	CH 12
5.	Identify abnormal operating noises in the A/C system.	P-3	CH 12
6.	Visually inspect A/C system for signs of leaks.	P-1	CH 12
7.	Verify heating and air conditioning concerns.	P-1	CH 12
8.	Research the need to place a vehicle in service mode before servicing the HVAC system.	P-1	CH 12

B. Refrigeration System Components

1.	Inspect and/or replace A/C compressor drive belts, pulleys, and tensioners.	P-1	CH 12
2.	Inspect for proper A/C condenser airflow.	P-2	CH 12
3.	Inspect evaporator housing condensation drain.	P-1	CH 12

C. Heating, Ventilation, and Engine Cooling Systems

1.	Inspect engine cooling and heater systems hoses and pipes.	P-1	CH 12

D. Operating Systems and Related Controls

1.	Inspect HVAC system ducts, doors, hoses, cabin filters, and outlets.	P-1	CH 12
2.	Identify the source of HVAC system odors.	P-2	CH 12

E. Refrigerant Recovery, Recycling, and Handling

1.	Demonstrate knowledge of the requirement to recover, recycle, and handle refrigerants using proper equipment and procedures.	P-1	CH 12

VIII. ENGINE PERFORMANCE - MLR 2024

A. General

1.	Research vehicle service information such as fluid type, vehicle service history, service precautions, technical service bulletins, and recalls including xEVs and vehicles equipped with advanced driver assistance systems (ADAS).	P-1	CH 1, CH 2, CH 6, CH 8, CH 11, CH 13, CH 17, CH 20
2.	Retrieve and record on-board diagnostic DTCs, monitor status, and freeze frame data; clear codes and data when directed.	P-1	CH 20
3.	Demonstrate knowledge of proper engine cooling system operation.	P-1	CH 12
4.	Demonstrate knowledge of camshaft timing including engines equipped with variable valve timing (VVT) systems.	P-1	

B. Computerized Controls

1.	Identify computerized control system components and configurations.	P-1	CH 9

C. Ignition System

1.	Identify ignition system components and configurations.	P-1	CH 13
2.	Remove and replace spark plugs; inspect secondary ignition components for wear and damage.	P-2	CH 13

D. Fuel, Air Induction, and Exhaust System

1.	Identify fuel, air induction, and exhaust system components and configurations.	P-1	CH 11, CH 17
2.	Replace fuel filter(s) where applicable.	P-3	CH 11
3.	Inspect, service, or replace air filters, filter housings, and intake duct work.	P-1	CH 11
4.	Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields.	P-1	CH 17
5.	Inspect condition of exhaust system hangers, brackets, clamps, and heat shields.	P-1	CH 17
6.	Check and refill diesel exhaust fluid (DEF).	P-3	CH 17

E. Emissions Control Systems

1.	Identify emission control system components and configurations.	P-1	CH 11, CH 17
2.	Inspect, test, and service, and/or replace positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses.	P-2	CH 11, CH 17

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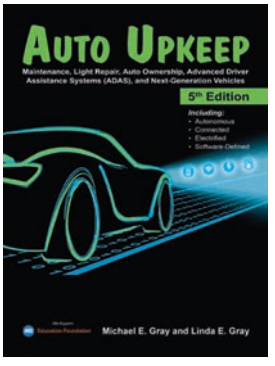
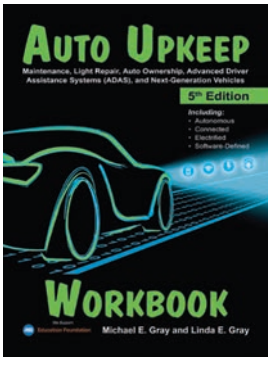
Auto Upkeep

Maintenance, Light Repair, Auto Ownership, Advanced Driver Assistance Systems (ADAS), and Next-Generation Vehicles





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