

TRUMBULL PUBLIC SCHOOLS

Trumbull, Connecticut

AUTOMOTIVE SYSTEMS

Grades 10-12

Technology Education Department

2020

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Automotive Systems

Property of Trumbull Public Schools

**Automotive Systems
Grades 10-12
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The Trumbull Board of Education promotes non-discrimination in all of its programs, including educational opportunities and services provided to students, student assignment to schools and classes, and educational offerings and materials.

CORE VALUES AND BELIEFS

The Trumbull High School community engages in an environment conducive to learning which believes that all students will **read and write effectively**, therefore communicating in an articulate and coherent manner. All students will participate in activities **that present problem-solving through critical thinking**. Students will use technology as a tool applying it to decision making. We believe that by fostering self-confidence, self-directed and student-centered activities, we will promote **independent thinkers and learners**. We believe **ethical conduct** to be paramount in sustaining the welcoming school climate that we presently enjoy.

Approved 8/26/2011

INTRODUCTION & PHILOSOPHY

This course is designed to help students build on their previous knowledge to develop a more thorough understanding of the different automotive systems. Topics covered will include safe work habits, the proper use of tools and equipment, the intake system, forced induction methods, the cooling system, the exhaust system, steering and suspension, and more. Safety and tool comprehension will also be reviewed. All units will include classroom theory as well as hands-on practical projects in the lab area.

The philosophy of this course is to make course content as real-world-applicable as possible and help students better understand how to diagnose and solve problems. We live in a society where things are often “throwaway” items, or easily replaced. With an automobile, or another method of transportation, this isn’t always the case. As students progress through life they should realize that things we so heavily rely on are things we should work to understand. This course, like other Technology Education courses, teaches students to be self-sufficient and gain confidence in themselves. What this class teaches students are lifelong skills that can be used throughout their entire lifetime.

COURSE GOALS

The following course goals derive from the 2014 Connecticut Technology Education Standards.

- AUTO.01 Demonstrate the value and necessity of practicing personal and occupational safety and protecting the environment by using materials and processes in accordance with manufacturer and industry standards.
- AUTO.02 Explain the basic processes and procedures for maintaining a clean, safe, and customer-friendly shop.
- AUTO.03 Explain scientific principles in relation to chemical, mechanical, and physical functions for various engine and vehicle systems.
- AUTO.04 Perform and document maintenance procedures in accordance with the recommendations of the manufacturer.

AUTO.05	Diagnose and repair engines, including but not limited to two- and four-stroke and supporting subsystems.
AUTO.07	Describe the components and functions of the various systems that are related to engine performance.
AUTO.08	Identify and describe the function of the components that make up suspension and steering systems.
ENG.04	Design using the appropriate materials in engineering by identifying, comparing, selecting, and testing.
ENG.05	Work collaboratively in engineering teams throughout the design process.
ENG.06	Use engineering equipment, laboratory materials, and tools appropriately and safely.

The following course goal derives from the 2010 Connecticut Core Standards.

CCS.MP.5 Use appropriate tools strategically.

The following course goals derive from the 2016 International Society for Technology in Education Standards.

ISTE Empowered Learner (Standard 1)	Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals, informed by the learning sciences.
ISTE Knowledge Constructor (Standard 3)	Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts, and make meaningful learning experiences for themselves and others.
ISTE Computational Thinker (Standard 5)	Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.
ISTE Creative Communicator (Standard 6)	Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals.

COURSE ENDURING UNDERSTANDINGS

Students will understand that . . .

- there are many different systems of a vehicle that must work together seamlessly.
- safety in technology labs is required of everyone.
- there is a specific tool meant for each job, and thought should be put into finding the best tool for each situation.

COURSE ESSENTIAL QUESTIONS

- What is the correct method to safely handle and appropriately use tools?
- Why is the automotive intake system essential for the functioning of an engine?
- What are the service and maintenance intervals to ensure a proper working induction system?
- What is the difference between a naturally aspirated (NA) and a forced induction engine?
- How can we provide an engine with more combustible air?
- What is the path that intake air follows from the intake stroke through the exhaust stroke?
- What are the different engine cylinder configurations?
- How can internal combustion engines stay at a constant temperature?
- What are the jobs of the exhaust system?
- What are the names and purposes of each of the exhaust system components?
- Why are vehicles equipped with suspension systems?
- What components make up an independent front suspension?
- What kind of suspension system is equipped on the rear of vehicles?

COURSE KNOWLEDGE & SKILLS

Students will know . . .

- how to be safe in the automotive workshop.
- the air intake system as the first step of the four-stroke process in a combustion engine.
- the key elements of, and differences between, a SOHC engine and a DOHC engine.
- all the tasks for which the automotive exhaust system is responsible.

Students will be able to . . .

- correctly select and safely use the best tool for each automotive job.
- locate the air filter and other serviceable intake system components and determine if replacement is necessary.
- identify engine configuration and valve train layouts.
- follow a repair manual to assemble engine components.

COURSE SYLLABUS

Course Name

Automotive Systems

Level

Grades 10-12

Prerequisites

Successful completion of Intro to Automotive Technology

Materials Required

None

General Description of the Course

This course is designed to help students build on their previous knowledge to develop a more thorough understanding of the different automotive systems. Topics covered will include safe work habits, the proper use of tools and equipment, the intake system, forced induction methods, the cooling system, the exhaust system, steering and suspension, and more. Safety and tool comprehension will also be reviewed. All units will include classroom theory as well as hands-on practical projects in the lab area.

Assured Assessments

- Written assessment based on lab safety procedures (Unit 1)
- Performance assessment to demonstrate understanding of the proper use of tools (Unit 2)
- Quizzes on unit material (Units 2, 3, 4, 5, 6, 7, 8)
- Hands-on identification using in-class vehicle (Units 3, 6, 7, 8)
- Proper use of procedures on student vehicles (Units 3, 6, 7)
- Group-created digital presentation (Unit 4)
- Group disassembly, inspection, and reassembly of automotive engine (Unit 5)

UNIT 1

General Lab Safety

Unit Goals

At the completion of this unit, students will:

ENG.06 Use engineering equipment, laboratory materials, and tools appropriately and safely.

AUTO.01.05 Demonstrate and explain knowledge of personal safety practices such as eyewear, clothing, footwear, and personal protective equipment (PPE).

Unit Essential Questions

- Why is it important that everyone understands and follows the safety procedures in and around the lab?
- What do I need to know in an emergency situation in the lab?
- What are the different types of Personal Protective Equipment (PPE)?

Scope and Sequence

1. Emergency power shut-offs
2. Fire drill procedures
3. Stay-put procedures
4. Lockdown procedures
5. First Aid kit
6. Eyewash / Shower station
7. Personal Protective Equipment (PPE)
8. Material Data Safety Sheets (MSDS)

Assured Assessments

- Written assessment based on specific lab safety procedures for the class

Resources

Supplemental

- Note-taking sheets related to safety procedures

Time Allotment

- Approximately 1 week

UNIT 2

Review of Tools

Unit Goals

At the completion of this unit, students will:

AUTO.01.06 Demonstrate and explain knowledge of shop safety procedures when performing tasks, such as raising a vehicle with a floor jack.

AUTO.01.07 Identify basic hand tools and their usage in the automotive industry.

Unit Essential Questions

- Why are there SAE and metric-specific sized tools?
- What are the different kinds of hammers, and hammer accessories?
- What are different characteristics sockets can have?
- Why is a torque wrench important, and where is it used?
- What are the different styles of wrenches?
- Where can pliers be used?
- What differences exist among screwdriver bits?

Scope and Sequence

1. Fractional-sized hardware for American-made vehicles; metric-sized hardware for foreign-made vehicles
2. Ball peen hammer, dead blow hammer, rubber mallet, claw hammer, starting punch
3. Opening size, drive size, metric/fractional, 6 pt / 12 pt, deep/shallow, chrome/impact
4. Importance of making a piece of hardware an exact tightness, used anywhere where precise fitment is needed, especially where two machined surfaces meet to seal
5. Combination, open end, box end, flare nut wrenches
6. Holding, cutting, pulling, twisting, tightening, loosening a fastener or object
7. Phillips, flathead, torx, Allen screwdrivers: different styles of engagement and points of contact to allow better grip because of contacting surface area

Assured Assessments

- Performance assessment: Working in small workstations to demonstrate understanding of the proper use of tools
- Written quiz aligning with teacher-presented information

Resources

Core

- Guided note-taking sheets related to each type of tool
- Hands-on practice with each tool

Supplemental

- Additional print resources for further clarification

Time Allotment

- Approximately 2 weeks

UNIT 3

The Engine Air Intake System

Unit Goals

At the completion of this unit, students will:

- | | |
|---|---|
| AUTO.07.02 | Describe the purpose, operation, and basic components of fuel and air induction systems. |
| AUTO.03.04 | Identify and describe the function of the basic engine components. |
| AUTO.02.03 | Explain what is included in an automobile maintenance schedule. |
| ISTE Empowered Learner
(Standard 1d) | Understand the fundamental concepts of technology operations, demonstrate the ability to choose, use, and troubleshoot current technologies, and are able to transfer their knowledge to explore emerging technologies. |

Unit Essential Questions

- Why is the automotive intake system essential for the functioning of an engine?
- What are the service and maintenance intervals to ensure a proper working induction system?
- What is the path that air takes from start to finish in the intake system?
- What sensors may monitor airflow going through the intake system?

Scope and Sequence

1. Intake system as supplying clean air to the engine, and controlling the flow of air through the system
2. Recommendations for changing the air filter every 12,000-15,000 miles depending on driving conditions, as well as cleaning the mass air flow sensor, since that can affect the fuel economy
3. Air filter, intake piping, IAT (Intake Air Temperature) sensor, MAF (Mass Air Flow) sensor, throttle body, TPS (Throttle Position Sensor)

Assured Assessments

- Hands-on identification using in-class vehicle, followed by inspection and cleaning procedure on student vehicles
- Written quiz aligning with teacher-presented information

Resources

Core

- Visual presentations
- Demonstration using shop vehicle

Supplemental

- Guided note-taking sheets

Time Allotment

- Approximately 2 weeks

UNIT 4

Forced Induction

Unit Goals

At the completion of this unit, students will:

AUTO.04.04	Evaluate the advantages and disadvantages of existing, new, and emerging systems and the effects of those systems on the environment.
ISTE Knowledge Constructor (Standard 3a)	Plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
ISTE Computational Thinker (Standard 5d)	Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.
ISTE Creative Communicator (Standard 6c)	Communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models, or simulations.

Unit Essential Questions

- How does forced induction benefit an engine?
- What are the different forced induction methods?
- What are the different types of superchargers?
- How is a supercharger different from a turbocharger?

Scope and Sequence

1. Forced induction as allowing smaller displacement engines to be more powerful, with efficient use of intake air
2. Superchargers and turbochargers
3. Roots supercharger, twin screw supercharger, centrifugal supercharger
4. Superchargers as belt-driven from the engine's crankshaft, providing an instant surge in power, normally located high on the engine. Turbochargers as efficiently using wasted exhaust gas to provide a surge in power, normally at higher RPMs.

Assured Assessments

- Group-created digital presentation
- Group-created quiz based on information from digital presentations

Resources

Core

- Visual presentations and digital clips

Supplemental

- Guided print presentations for quiz resources

Time Allotment

- Approximately 2 weeks

UNIT 5

The Engine Cylinder Head

Unit Goals

At the completion of this unit, students will:

- | | |
|------------|--|
| AUTO.03.02 | Describe basic valve train operation and configuration, such as DOHC, SOHC, OHV, and flathead. |
| AUTO.03.03 | Describe basic engine cylinder configurations such as V, inline, and horizontally opposed. |
| CCS.MP.5 | Use appropriate tools strategically. |
| ENG.05.01 | Read and understand design documentation and technical manuals. |

Unit Essential Questions

- How does the camshaft lobe dimension affect the valve aperture?
- What are the different parts of the valve?
- How do all the valve train components work together?
- What are the differences between DOHC and SOHC engines?
- What are the different engine cylinder combinations?

Scope and Sequence

1. Lifting and width of the camshaft: The more lift the camshaft has, the more the valve will open; the wider the camshaft duration profile, the longer the valve will stay open
2. Head, margin, face, stem
3. Camshaft lobe as transferring motion to a valve lifter (solid, mechanical), which can push back on a pushrod or the valve depending on engine layout; once opened, the valve will close back on its seat because of the valve spring, retainer, and keepers.
4. Dual OverHead Camshaft, Single OverHead Camshaft, with some engines having more than one camshaft on top of the engine depending on the quality of valves
5. Inline, V-style, horizontally opposed

Assured Assessments

- Written quiz aligning with teacher-presented information
- Group disassembly, inspection, and reassembly of automotive engine to observe and analyze components that work together

Resources

Core

- Visual presentations and digital clips
- Worksheets

- Hands-on engine disassembly

Supplemental

- Guided note-taking sheets

Time Allotment

- Approximately 4 weeks

UNIT 6

The Cooling System

Unit Goals

At the completion of this unit, students will:

- AUTO.03.06 Describe the purpose, operation, and basic components of engine cooling systems.
- AUTO.05.02 Maintain, diagnose, service, and repair lubrication and cooling systems.

Unit Essential Questions

- How does the engine cooling system make an engine run more efficiently?
- How is the cooling system powered, and what is the heart of the system?
- Why is the radiator so important?
- What component of the cooling system is also responsible for giving us heat inside our cars?

Scope and Sequence

1. Engines as performing best when they are warmed up, the thermostat allowing the engine to get up to temperature and then maintain that temperature
2. The cooling system as powered by the crankshaft via the serpentine belt, which spins a water pump, which forces a liquid through the engine, displacing engine heat
3. The radiator as a big heat exchanger, cooling liquid coolant before it reenters the engine, with many radiators also doubling as a transmission cooler
4. Hot liquid from the engine as traveling to a heater core under the dashboard, a fan blowing air through the heater core to give heat inside the car during cold months

Assured Assessments

- Hands-on identification using in-class vehicle, followed by inspection procedure on student vehicles to observe and analyze where components are located on cars of different brands
- Written quiz aligning with teacher-presented information

Resources

Core

- Visual presentations and digital clips
- Demonstration using shop vehicle

Supplemental

- Guided note-taking sheets

Time Allotment

- Approximately 2 weeks

UNIT 7

The Exhaust System

Unit Goals

At the completion of this unit, students will:

- | | |
|------------|--|
| AUTO.05.04 | Describe and demonstrate the process for performing exhaust inspection and service. |
| ENG.04.04 | Explain the process used for selecting the correct materials for specific functions. |

Unit Essential Questions

- What is the purpose of the exhaust system?
- What are the components of the exhaust system?
- What are things that can wrong with an exhaust system?

Scope and Sequence

1. Redirecting the flow of harmful exhaust gases behind the driver component of a vehicle, quieting the sound produced as a byproduct of the engine, controlling the emissions quality of exhaust gases
2. Exhaust manifold, exhaust piping, catalytic converter, oxygen sensors, resonator, hangers/flangers, muffler, tailpipe
3. Deterioration of metal components, gaskets failing and leaking, catalytic converters getting clogged, oxygen sensors going bad and causing reduced fuel economy

Assured Assessments

- Hands-on identification using in-class vehicle, followed by inspection procedure on student vehicles
- Written quiz aligning with teacher-presented information

Resources

Core

- Visual presentations and digital clips
- Demonstration using shop vehicle

Supplemental

- Guided note-taking sheets

Time Allotment

- Approximately 2 weeks

UNIT 8

The Suspension System

Unit Goals

At the completion of this unit, students will:

- AUTO.08.02 Describe the purpose, operation, and basic components of the suspension system.
- AUTO.08.03 Explain caster, camber, and toe-in wheel alignment angles.
- AUTO.08.04 Identify factors that cause abnormal tire wear.

Unit Essential Questions

- Why are vehicles equipped with suspension systems?
- What are common types of front suspension systems?
- What are common types of rear suspension systems?
- What suspension systems affect car alignment?

Scope and Sequence

1. Absorbing shock and road irregularities, supporting the vehicle's weight, providing a point of attachment for wheels
2. Coil spring, torsion bar, MacPherson strut
3. Leaf spring
4. Caster, camber, toe

Assured Assessments

- Written quiz aligning with teacher-presented information
- Hands-on identification using in-class vehicle

Resources

Core

- Visual presentations and digital clips
- Demonstration using shop vehicle

Supplemental

- Guided note-taking sheets

Time Allotment

- Approximately 2 weeks

COURSE CREDIT

One-half credit in technology education
One class period daily for a half year

PREREQUISITES

Successful completion of Intro to Automotive Technology

CURRENT REFERENCES

- *Automotive Excellence*. Vols. 1 & 2. 2nd ed. New York: Glencoe, 2004. Print.
- *HowStuffWorks*. <https://www.howstuffworks.com/>. Accessed November 3, 2020. Web.
- *MotorTrend*. <https://www.motortrendondemand.com/>. Accessed November 3, 2020. Web.
- Toboldt, William J., Larry Johnson, and W. Scott Gauthier. *Automotive Encyclopedia*. 9th ed. Tinley Park, IL: Goodheart-Willcox, 1995. Print.

ASSURED STUDENT PERFORMANCE RUBRICS

- Trumbull High School School-Wide Problem-Solving through Critical Thinking Rubric (attached)
- Trumbull High School School-Wide Social & Civic Expectations Rubric (attached)
- Trumbull High School School-Wide Independent Learning and Thinking Rubric (attached)
- Automotive Systems Forced Induction Group Digital Presentation & Rubric (attached)
- Automotive Systems The Engine Cylinder Head: Specifications for Your Car Engine (attached)

Trumbull High School School-Wide Problem-Solving through Critical Thinking Rubric

Category/ Weight	Exemplary 4 Student work:	Goal 3 Student work:	Working Toward Goal 2 Student work:	Needs Support 1-0 Student work:
Understanding X_____	Student demonstrates clear understanding of the problem and the complexities of the task.	Student demonstrates sufficient understanding of the problem and most of the complexities of the task.	Student demonstrates some understanding of the problem but requires assistance to complete the task.	Student demonstrates limited or no understanding of the fundamental problem after assistance with the task.
Research X_____	Student gathers compelling information from multiple sources including digital, print, and interpersonal.	Student gathers sufficient information from multiple sources including digital, print, and interpersonal.	Student gathers some information from few sources including digital, print, and interpersonal.	Student gathers limited or no information.
Reasoning and Strategies X_____	Student demonstrates strong critical thinking skills to develop a comprehensive plan integrating multiple strategies.	Student demonstrates sufficient critical thinking skills to develop a cohesive plan integrating strategies.	Student demonstrates some critical thinking skills to develop a plan integrating some strategies.	Student demonstrates limited or no critical thinking skills and no plan.
Final Product and/or Presentation X_____	Solution shows deep understanding of the problem and its components. Solution shows extensive use of 21 st -century technology skills.	Solution shows sufficient understanding of the problem and its components. Solution shows sufficient use of 21 st -century technology skills.	Solution shows some understanding of the problem and its components. Solution shows some use of 21 st -century technology skills.	Solution shows limited or no understanding of the problem and its components. Solution shows limited or no use of 21 st -century technology skills.

Trumbull High School School-Wide Social & Civic Expectations Rubric

Category/ Weight	Exemplary 4	Goal 3	Working Toward Goal 2	Needs Support 1-0
Responsibility for Self X_____	<ul style="list-style-type: none"> Highly self-directed Consistently displays ethical conduct in the classroom and on campus 	<ul style="list-style-type: none"> Self-directed Displays ethical conduct in the classroom and on campus 	<ul style="list-style-type: none"> Occasionally self-directed At times displays ethical conduct in the classroom and on campus 	<ul style="list-style-type: none"> Rarely self-directed Seldom displays ethical conduct in the classroom and on campus
Respects Others X_____	<ul style="list-style-type: none"> Sensitive and considerate to others 	<ul style="list-style-type: none"> Considerate to others 	<ul style="list-style-type: none"> At times considerate to others 	<ul style="list-style-type: none"> Insensitive to others
Practices Interpersonal Skills X_____	<ul style="list-style-type: none"> Champions discussions to resolve differences through active listening and offers opinions without prompting in a positive and rational manner 	<ul style="list-style-type: none"> Actively discusses avenues to resolve differences when appropriate, and offers encouraging opinions when prompted 	<ul style="list-style-type: none"> At times, appears indifferent to others, does not seek avenues to resolve differences, and is inflexible in his or her own opinions 	<ul style="list-style-type: none"> Demonstrates intolerance and lacks social interaction skills
Cultural Understanding X_____	<ul style="list-style-type: none"> Demonstrates a high level of cultural understanding and respect for the uniqueness of others, their practices and perspectives 	<ul style="list-style-type: none"> Demonstrates an appreciation of cultural understanding and respect for the uniqueness of others, their practices and perspectives 	<ul style="list-style-type: none"> Demonstrates little appreciation of cultural understanding and respect for the uniqueness of others, their practices and perspectives 	<ul style="list-style-type: none"> Demonstrates a lack of appreciation of cultural understanding and respect for the uniqueness of others, their practices and perspectives

Trumbull High School School-Wide Independent Learning and Thinking Rubric

Category/Weight	Exemplary 4	Goal 3	Working Toward Goal 2	Needs Support 1-0
Proposal X_____	Student demonstrates a strong sense of initiative by generating compelling questions, creating uniquely original projects/work.	Student demonstrates initiative by generating appropriate questions, creating original projects/work.	Student demonstrates some initiative by generating questions, creating appropriate projects/work.	Student demonstrates limited or no initiative by generating few questions and creating projects/work.
Independent Research & Development X_____	Student is analytical, insightful, and works independently to reach a solution.	Student is analytical, and works productively to reach a solution.	Student reaches a solution with direction.	Student is unable to reach a solution without consistent assistance.
Presentation of Finished Product X_____	Presentation shows compelling evidence of an independent learner and thinker. Solution shows deep understanding of the problem and its components. Solution shows extensive and appropriate application of 21 st Century Skills.	Presentation shows clear evidence of an independent learner and thinker. Solution shows adequate understanding of the problem and its components. Solution shows adequate application of 21 st Century Skills.	Presentation shows some evidence of an independent learner and thinker. Solution shows some understanding of the problem and its components. Solution shows some application of 21 st Century Skills.	Presentation shows limited or no evidence of an independent learner and thinker. Solution shows limited or no understanding of the problem. Solution shows limited or no application of 21 st Century Skills.

Automotive Systems Forced Induction Group Digital Presentation

Name: _____

Period: _____

Forced Induction Group Presentation Self-Grading Sheet

My group's topic was: _____

I was responsible for looking up the following information that was part of my group's presentation: _____

I made slide #'s _____.

The things I feel like I did well while researching my topic and preparing my information that was used in the presentation were: _____

Things I could have done a better job on: _____

According to the Use of Class Time category from the rubric, I feel like I deserve a ____/4 points.

	4	3	2	1
Use of Class Time	Used time well during each class period. Focused on getting the project done and never distracting others.	Used time well during the class period. Usually focused on getting the project done and not distracting others.	Used some of the time well during each class period. There was some focus on getting the project done, but occasionally distracted others.	Did not use class time to focus on the project, or often distracted others.

I feel this way because: _____.

Automotive Systems Forced Induction Group Digital Presentation Rubric

	Exemplary 4	Goal 3	Working Toward Goal 2	Needs Support 1-0	Self Grade	Teacher Grade
Purpose	Achieves a clear and distinct purpose and communicates the main ideas clearly. Topic is clearly written.	Purpose is clear, although the main ideas could show greater specificity.	Communicates an identifiable purpose and/or idea.	Unclear purpose or idea.		
Relevant Information	Covers all the appropriate categories of their topic. Information is understood after topic has been presented.	Most categories are covered, although some information is still unclear.	Some categories are covered, yet key information is unclear.	Many categories are not covered. Information is missing.		
Organization	Presentation is set up in an easy-to-follow format that is clearly written with pictures to go along with descriptions. At least one slide per step/topic.	Presentation is clear to follow. A few pictures are missing that could have been helpful for visuals. Slide organization is adequate.	Presentation is somewhat clear to follow. Pictures are missing that could have been helpful for visuals. Slide organization is inadequate.	Presentation is unorganized. Slides may contain too much text.		
Use of Class Time	Used time well during each class period. Focused on getting the project done and never distracting others.	Used time well during the class period. Usually focused on getting the project done and not distracting others.	Used some of the time well during each class period. There was some focus on getting the project done, but occasionally distracted others.	Did not use class time to focus on the project, or often distracted others.		

Total Score: _____ / _____

Automotive Systems
The Engine Cylinder Head: Specifications for Your Car Engine

Name: _____

Date: _____

Manufacturer: _____

Number of Cylinders: _____

Number of liters or cc's or cu/in': _____ (This you'll have to find after online searching.)

Engine block casting number/model numbers: _____ (if you can see any)

Using the information from above, you need to find the following:

Cylinder Head Bolt-Torque Sequence: _____

Cylinder Head Bolt-Torque Specification (which can sometimes be more than one "step"):

How to set the timing on your engine: Timing marks on the crankshaft, camshaft, and anywhere else (printing pictures where applicable): _____

Valve Cover Torque: _____

Intake Manifold Torque: _____

Exhaust Manifold Torque: _____