



**Literacy Design  
Collaborative**

# Force and Motion: a study of the application of concepts to auto design

★ TASK ★ LADDER

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When thinking of car design, students usually only think of the shape (aerodynamics) of the car when they think of design. Through this module, students will better understand that design encompasses more than shape. Force and motion are a unit that covers speed, velocity, acceleration, weight, forces, energy, power, and work. The type of vehicles are changed each year to first have the most current vehicles to argue on, and second to ensure that the students are reading the material and not relying on what they heard from previous students. Many students are looking into getting learner permits for driving or even their license and this unit and module puts all of those qualities into perspective.

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GRADES

**9 - 10**

DISCIPLINE

 **Science**

COURSE

 **Physical  
Science/Physics**

PACING

 **N/A**

# *Section 1: What Task?*

## ***Teaching Task***

### ***Task Template 2 - Argumentation***

Which three (3) designs of a vehicle greatly affect gas mileage? After reading articles and informational texts, write a multi-paragraph essay that addresses the question and support your position with evidence from the text(s). Be sure to acknowledge competing views. Give examples from past or current events or issues to illustrate and clarify your position.

## ***Standards***

### ***Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects***

#### **RST.9-10.1**

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

#### **RST.9-10.4**

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9—10 texts and topics.

#### **RST.9-10.5**

Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

#### **RST.9-10.7**

Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

#### **RST.9-10.9**

Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

#### **RST.9-10.10**

By the end of grade 10, read and comprehend science/technical texts in the grades 9—10 text complexity band independently and proficiently.

#### **WHST.9-10.1**

Write arguments focused on discipline-specific content.

#### **WHST.9-10.2**

Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

## WHST.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

## WHST.9-10.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

## WHST.9-10.9

Draw evidence from informational texts to support analysis, reflection, and research.

### ***Louisiana Science Grade-Level Expectations***

Differentiate between mass and weight (PS-H-E1)

Differentiate between speed and velocity (PS-H-E2)

Calculate velocity and acceleration using equations (PS-H-E2)

Describe and demonstrate the motion of common objects in terms of the position of the observer (PS-H-E4)

### ***Next Generation Science Standards***

## HS-PS1-1

Focus

Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

## ***Texts***

- 🔗 [Ford Mustang review. The factory specifications of the Ford Mustang. \(student/teacher\)](#)
- 🔗 [2014 Ford Mustang. Ford's factory specifications. \(student/teacher\)](#)
- 🔗 [MotorTrends Chevy Corvette factory specifications. \(student/teacher\)](#)
- 🔗 [Chevy Corvette review and specs. \(student\)](#)
- 🔗 [Find and compare cars](#)
- 🔗 [Car and Driver Magazine](#)
- 🔗 [Edmunds.com](#)

## Student Work Rubric - Argumentation Task - Grades 9-12

	Emerging	Approaches Expectations	Meets Expectations	Advanced
	1	2	3	4
<b>Controlling Idea</b>	Makes a general claim with an unclear focus.	Establishes a <b>clear</b> claim that <b>addresses the prompt</b> , with an <b>uneven focus</b> .	Establishes <b>and maintains</b> a <b>clear, specific, and credible</b> claim that addresses <b>all aspects</b> of the prompt.	Establishes and maintains a <b>precise, substantive</b> claim that addresses all aspects of the prompt. <b>Acknowledges limitations and/or the complexity of the issue or topic</b> .
<b>Selection &amp; Citation of Evidence</b>	Includes minimal details from sources. Sources are used without citation.	Includes <b>details, examples, and/or quotations</b> from sources that are <b>relevant to the claim</b> . <b>Inconsistently</b> cites sources.	Includes details, examples, and/or quotations from sources that <b>support</b> the claim and <b>supporting ideas</b> . <b>Consistently</b> cites sources with <b>minor formatting errors</b> .	Includes <b>well-chosen</b> details, examples, and/or quotations from sources that <b>fully support</b> the claim and supporting ideas. <b>Consistently</b> cites sources using <b>appropriate format</b> .
<b>Development / Explanation of Sources</b>	Explanation of ideas and source material is irrelevant, incomplete, or inaccurate.	Explains ideas and source material <b>to support the argument</b> , with <b>some incomplete reasoning or explanations</b> .	<b>Accurately</b> explains ideas and source material and <b>how they support</b> the argument.	<b>Thoroughly</b> and accurately explains ideas and source material, <b>using logical reasoning to support and develop</b> the argument.
<b>Organization</b>	Lacks an evident structure. Makes unclear connections among claims, reasons, and/or evidence.	<b>Groups ideas and uses transitions</b> to develop the argument, with <b>some lapses in coherence or organization</b> .	<b>Groups and sequences</b> ideas to <b>develop a cohesive argument</b> . Uses transitions to <b>clarify the relationships among claim(s), reasons, and evidence</b> .	Groups and sequences ideas <b>in a logical progression in which ideas build to create a unified whole</b> . Uses <b>varied</b> transitions to clarify the <b>precise</b> relationships among claim(s), reasons, and evidence.
<b>Conventions</b>	Major errors in standard English conventions interfere with the clarity of the writing. Language or tone is inappropriate.	Errors in standard English conventions <b>sometimes interfere</b> with the clarity of the writing. Uses language and tone that are <b>sometimes inappropriate</b> for the audience and purpose.	<b>Consistently applies</b> standard English conventions; <b>minor errors</b> , while noticeable, <b>do not interfere</b> with the clarity of the writing. Uses language and tone <b>appropriate to the audience and purpose</b> .	Consistently applies standard English conventions, <b>with few errors</b> . Demonstrates <b>varied syntax</b> and <b>precise word choice</b> . <b>Consistently</b> uses language and tone appropriate to the audience and purpose.
<b>Content Understanding (Generic)</b>	Attempts to include disciplinary content in explanation or argument but understanding of content is weak; content is irrelevant, inappropriate, or inaccurate.	Briefly notes disciplinary content relevant to the prompt; shows basic or uneven understanding of content; minor errors in explanation.	Accurately presents disciplinary content relevant to the prompt with sufficient explanations that demonstrate understanding.	Integrates relevant and accurate disciplinary content with thorough explanations that demonstrate in-depth understanding.

## ***Background for Students***

How many of you are looking forward to getting your license? Do you realize that vehicles follow the principles of motion? We have learned velocity, acceleration, and force calculations and concepts. You are able to measure mass, distance, and time. Use these skills and concepts to define and defend your point of view.

## ***Extension***

Have the students draw a car with materials used and write an essay about it. They can also build a model and test it to see if it stands up against other groups models.

## *Section 2: What Skills?*

### ***Preparing for the Task***

**TASK ENGAGEMENT:** Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns

**TASK ANALYSIS:** Ability to understand and explain the task's rubric.

### ***Reading Process***

**ACTIVE READING:** Ability to annotate an article for unfamiliar terms, main ideas, and important questions

**ESSENTIAL VOCABULARY:** Ability to apply strategies for developing an understanding of text(s) by locating words and phrases that identify key concepts and facts, or information.

**ACADEMIC INTEGRITY:** Ability to use and credit sources appropriately.

**NOTE-TAKING:** Ability to read purposefully and select relevant information; to summarize and/or paraphrase.

### ***Transition to Writing***

**BRIDGING:** Ability to begin linking reading results to writing task through discussion.

### ***Writing Process***

**PLANNING:** Ability to develop a line of thought and text structure appropriate to an information/explanation task.

**MAIN POINT OF VIEW AND FOCUS:** Ability to establish a main point of view and consolidate information relevant to task. (create the main point and focus of the review)

**DEVELOPMENT:** Ability to construct an initial draft with an emerging line of thought and structure. (rough draft of review)

**REVISION:** Ability to refine text, including line of thought, language usage, and tone as appropriate to audience and purpose. (first peer review with collaboration and discussion to refine the thoughts and grammar)

**EDITING:** Ability to proofread and format a piece to make it more effective. (second peer review with different reviewer independently to further refine the review and grammar)

**COMPLETION:** Ability to submit final piece that meets expectations.

## Section 3: What Instruction?

PACING	SKILL AND DEFINITION	PRODUCT AND PROMPT	SCORING GUIDE	INSTRUCTIONAL STRATEGIES
<b>Preparing for the Task</b>				
20 mins	<b>TASK ENGAGEMENT:</b> Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns	<b>SHORT CONSTRUCTED RESPONSE</b> What is your first reaction to the task prompt? Add some notes of things you know about this issue.	Student meets expectations if he/she does the following:  Student demonstrates an understanding of the concept of car design and what goes into the design of a car.	<ul style="list-style-type: none"> <li>Link this task to earlier class content.</li> <li>Discuss student responses.</li> <li>Clarify timetable and support plans for the task.</li> </ul>
35 mins	<b>TASK ANALYSIS:</b> Ability to understand and explain the task's rubric.	<b>LIST</b> How is the rubric worded to aid you in this writing?	Student meets expectations if he/she does the following:  Deconstruction of the rubric and class discussion	<ul style="list-style-type: none"> <li>Share examples of type of text students will produce (either from past students or from professional writers).</li> <li>Identify or invite students to identify key features of examples.</li> <li>Pair students to share and improve their individual bullets.</li> <li>Create a classroom list: Choose one student to share a few ideas on the board, and ask other to add to it.</li> <li>task rubric deconstruction using jigsaw</li> </ul>
<b>Reading Process</b>				
30 mins	<b>ACTIVE READING:</b> Ability to annotate an article for unfamiliar terms, main ideas, and important questions	<b>SHORT CONSTRUCTED RESPONSE</b> What designs from the article affect the gas mileage of this vehicle? Which parts of the text show you that? D2 What competing arguments have you encountered or can you think of?	Student meets expectations if he/she does the following: <ul style="list-style-type: none"> <li>Answers questions with credible response.</li> </ul>	<ul style="list-style-type: none"> <li>Invite students to brainstorm ways to decipher the text language.</li> <li>Invite students to share and discuss their answers for each text.</li> <li>After the discussion, allow them to add to their entries.</li> </ul> To be completed over 3 class periods
10 mins	<b>ESSENTIAL VOCABULARY:</b> Ability to apply strategies for developing an understanding of text(s) by locating words and phrases that identify key concepts and facts, or information.	<b>LIST</b> In your notebook, list words and phrases essential to the texts. Add definitions, and (if appropriate) notes on connotation in this context.	Student meets expectations if he/she does the following: <ul style="list-style-type: none"> <li>Lists appropriate phrases.</li> <li>Provides accurate definitions.</li> </ul>	<ul style="list-style-type: none"> <li>After scoring, ask some students to share definitions of terms that others overlooked or misunderstood.</li> <li>After scoring, be willing to provide direct instruction or guide a close reading if needed to work through a key phrase most students missed.</li> </ul> This is an ongoing process throughout the module.
15 mins	<b>ACADEMIC</b>	<b>SHORT CONSTRUCTED</b>	Student meets	<ul style="list-style-type: none"> <li>Discuss respect for others' work to assemble</li> </ul>

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	<b>INTEGRITY:</b> Ability to use and credit sources appropriately.	<b>RESPONSE</b> Define "plagiarism" and list ways to avoid it. Have students write a bibliography for the class textbook.	expectations if he/she does the following: <ul style="list-style-type: none"><li>Provides accurate definition</li><li>Lists several appropriate strategies</li></ul>	evidence and create texts. <ul style="list-style-type: none"><li>Discuss academic penalties for stealing others thoughts and words.</li><li>Model how to use parenthetical citations in writings and other methods for citing evidence in writing. Students will be given the models and phrases in their writer's notebook.</li></ul>
30 mins	<b>NOTE-TAKING:</b> Ability to read purposefully and select relevant information; to summarize and/or paraphrase.	<b>NOTES</b> From each text, make a list of the elements that look most important for answering the prompt. Do what you need to do to avoid plagiarism.* L2(a) What strategies will you use to discern "credible sources"?	Student meets expectations if he/she does the following: <ul style="list-style-type: none"><li>Identifies relevant elements.</li><li>Includes information to support accurate citation (for example, page numbers for a long text, clear indication when quoting directly.</li></ul>	<ul style="list-style-type: none"><li>Teach a model format for note taking. (see Writer's Notebook attached to module. Look at using pros and cons on a split page process)</li><li>Check that early student work is in the assigned format (or in another format that gathers the needed information effectively).</li></ul> to be completed over 3 class periods
<b>Transition to Writing</b>				
40 mins	<b>BRIDGING:</b> Ability to begin linking reading results to writing task through discussion.	<b>NOTES</b> Which design do you believe has had the most impact on improving gas mileage? Using evidence from the articles, present an argument for your design. Be sure to listen to others as they present theirs as you may be able to counter their points with your evidence.	Student meets expectations if he/she does the following:  discussion with small group and whole group	<ul style="list-style-type: none"><li>Discussion-based strategies, (socratic seminar, fishbowl, and/or talk moves will be used depending on the class make-up and ability levels).</li><li>Small group discussion using question.</li></ul>
<b>Writing Process</b>				
30 mins	<b>PLANNING:</b> Ability to develop a line of thought and text structure appropriate to an information/explanation task.	<b>OUTLINE</b> Create an outline based on your notes and reading in which you state your main idea, sequence your points, and note your supporting evidence.	Student meets expectations if he/she does the following: <ul style="list-style-type: none"><li>Creates an outline or organizer.</li><li>Supports controlling idea. Uses evidence from texts read earlier.</li></ul>	<ul style="list-style-type: none"><li>Provide and teach one or more examples of outlines or organizers (see writer's notebook attached to the module).</li><li>Invite students to generate questions in pairs about how the format works, and then take and answer questions.</li></ul>



20 mins	<b>MAIN POINT OF VIEW AND FOCUS:</b> Ability to establish a main point of view and consolidate information relevant to task. (create the main point and focus of the review)	<b>SHORT CONSTRUCTED RESPONSE</b> Write an opening paragraph that includes a main idea and sequences the key points you plan to make in your review.	Student meets expectations if he/she does the following: <ul style="list-style-type: none"> <li>Writes a thesis statement or draft opening.</li> <li>Provides direct answer to main prompt requirements.</li> <li>Establishes a main idea.</li> <li>Identifies key points that support development of argument.</li> </ul>	<ul style="list-style-type: none"> <li>Offer several examples of opening paragraphs.</li> <li>Ask class to determine what makes them strong or weak.</li> <li>Review the list that students created earlier to identify needed elements (from Cluster 1, skill 2).</li> </ul>
45 mins	<b>DEVELOPMENT:</b> Ability to construct an initial draft with an emerging line of thought and structure. (rough draft of review)	<b>LONG CONSTRUCTED RESPONSE</b> Write an initial draft complete with opening, development, and closing; insert and cite textual evidence.	Student meets expectations if he/she does the following: <ul style="list-style-type: none"> <li>Provides complete draft with all parts.</li> <li>Supports the opening in the later sections with evidence and citations.</li> </ul>	<ul style="list-style-type: none"> <li>Encourage students to re-read prompt partway through writing, to check that they are on track.</li> </ul>
45 mins	<b>REVISION:</b> Ability to refine text, including line of thought, language usage, and tone as appropriate to audience and purpose. (first peer review with collaboration and discussion to refine the thoughts and grammar)	<b>LONG CONSTRUCTED RESPONSE</b> Refine composition's analysis, logic, and organization of ideas/points. Use textual evidence carefully, with accurate citations. Decide what to include and what not to include.	Student meets expectations if he/she does the following: <ul style="list-style-type: none"> <li>Provides complete draft with all parts.</li> <li>Supports the opening in the later sections with evidence and citations.</li> <li>Improves first draft.</li> </ul>	<ul style="list-style-type: none"> <li>Sample useful feedback that balances support for strengths and clarity about weaknesses.</li> <li>Assign students to provide each other with feedback on those issues.</li> </ul>
40 mins	<b>EDITING:</b> Ability to proofread and format a piece to make it more effective. (second peer review with different reviewer independently to further refine the review and grammar)	<b>EDITING AND PROOFREADING</b> Revise draft to have sound spelling, capitalization, punctuation, and grammar. Adjust formatting as needed to provide clear, appealing text.	Student meets expectations if he/she does the following: <ul style="list-style-type: none"> <li>Provides draft free from distracting surface errors.</li> <li>Uses format that supports</li> </ul>	<ul style="list-style-type: none"> <li>Briefly review selected skills that many students need to improve.</li> <li>Teach a short list of proofreading marks (provided by the school district from the ELA classes)</li> <li>Assign students to proofread each other's texts a second time.</li> </ul>

			purpose.	
45 mins	<b>COMPLETION:</b> Ability to submit final piece that meets expectations.	<b>LONG CONSTRUCTED RESPONSE</b> Turn in your complete set of drafts, plus the final version of your piece	Student meets expectations if he/she does the following: <ul style="list-style-type: none"> <li>Fits the "Meets Expectations" category in the rubric for the teaching task.</li> </ul>	Students will complete the final draft and turn in all drafts with Writer's notebook and typed final draft.

## Instructional Resources

### Student Handout

 **Writer's Notebook**

## *Section 4: What Results?*

### ***Student Work Samples***

#### ***Advanced***

 **Advanced writing**

#### ***Meets Expectations***

 **Meets expectations**

#### ***Approaches Expectations***

 **Approaches expectations**

#### ***Not Yet***

 **Not Yet writing**

### ***Teacher Reflection***

There have been many revisions to this module through my 4 years teaching it. One suggestion is to change up the cars with similar type texts. This will keep the students engaged and get them looking forward to what is to come.

## ***All Attachments***

🔗 Ford Mustang review. The factory specifications of the Ford Mustang. (student/teacher) : <https://s ldc.org/u/bxc0bwfcgp5kwkgxx8g3mqrn b>

🔗 2014 Ford Mustang. Ford's factory specifications. (student/teacher) : <https://s ldc.org/u/7r8cvt6tu6ac2klv841a1pkkk>

🔗 MotorTrends Chevy Corvette factory specifications. (student/teacher) : <https://s ldc.org/u/4vvzco711738ddpqgy17ars42>

🔗 Chevy Corvette review and specs. (student) : <https://s ldc.org/u/cjwaff0p1mi2hlfy18uzval7u>

🔗 Find and compare cars : <https://s ldc.org/u/2p9la6a1vr2kdtqpyqncao0yw>

🔗 Car and Driver Magazine : <https://s ldc.org/u/48e5uwarw1s90vyd0az22iiw3>

🔗 Edmunds.com : <https://s ldc.org/u/1j5kq3kbdvdg5h1qer81gzn b6>

📄 Advanced writing : <https://s ldc.org/u/bzm9sf7a uy99o2lpy8ciozy1v>

📄 Meets expectations : <https://s ldc.org/u/d49qd78fozyuvlt4lail6gbso>

📄 Approaches expectations : <https://s ldc.org/u/3trg56f8asbzn m9p1rw874ynn>

📄 Not Yet writing : <https://s ldc.org/u/eelidkjps6xll80o5cxrmc qy j>

📄 Writer's Notebook : <https://s ldc.org/u/er23txluerep0jr4f0r3f8pf4>