

# Gold Seal Lessons

## for

# Rigor and Relevance

## Grades 9-12



International Center  
for Leadership in Education

## **Acknowledgment**

The International Center for Leadership in Education thanks the teachers in the Successful Practices Network for sharing their lessons with us.

Excepting those portions intended for classroom or training use, no part of this publication may be reproduced in whole or in part, or stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without written permission of the publisher. For information regarding permission, write to International Center for Leadership in Education. The International Center for Leadership in Education grants the purchaser of this publication permission to reproduce those pages intended for use in classrooms or training. Notice of copyright must appear on all copies of copyrighted materials.

**Copyright © 2008 by International Center for Leadership in Education**

**All rights reserved.**

Published by International Center for Leadership in Education  
Printed in the U.S.A.

ISBN 1-935300-01-6



**International Center for Leadership in Education  
1587 Route 146  
Rexford, New York 12148  
(518) 399-2776 (518) 399-7607 fax  
info@LeaderEd.com  
  
www.LeaderEd.com**

# Overview

---

The purpose of this kit is to provide high school educators with resources to assist students in achieving success in meeting education standards. The most critical standards are those that are assessed by high-stakes tests and those that are considered most useful to everyone in daily life. The latter are known as Essential Skills.

Each Gold Seal Lesson in this collection of 120 high rigor/high relevance lessons includes a performance task, Essential Skills, a scoring guide to share with students, and strategies for differentiating the lesson for English language learners. All lessons were written by teachers.

This kit includes the following lessons:

30 English Language Arts  
30 Mathematics  
30 Science  
30 Social Studies

## What Are Gold Seal Lessons?

Gold Seal Lessons are tasks or activities that are strategically designed to teach to specific academic standards/performance indicators/objectives/benchmarks. It is these standards that are assessed by high-stakes state and national tests, which are then used to evaluate individual student, school and district educational effectiveness.

Each Gold Seal Lesson is centered about a highly motivating theme, activity or project. The lessons are almost always multidisciplinary and deal with real-world situations or problems.

A lesson may take as little time as half a class period or as much as a year to complete. The task may run concurrently with other class activities, or it may be the exclusive activity for a period of time. Students sometimes work individually, but more frequently they accomplish the task in a small work group.

Gold Seal Lessons require students to learn and perform in a number of different ways. Students may research, write, compute, model, demonstrate, build, survey or report in a variety of academic, technical, work and community environments.

Working with Gold Seal Lessons requires the teacher to wear several hats, including instructor, curriculum specialist, coach, counselor, facilitator, manager and evaluator. A lesson may be directed by a single teacher or by a team of teachers within a grade level or across subject areas.

The International Center for Leadership in Education has been developing performance-based lessons since the mid-1990s. Over that time, revisions and improvements have been made to make the lessons more useful and effective.

## What Is Special about Gold Seal Lessons?

Gold Seal Lessons teach standards and Essential Skills to specified levels of rigor and relevance. Rigor is achieved by explicitly stating the Essential Skills that the student is expected to acquire and determining the level of rigor required using Bloom's Taxonomy (known here as the Knowledge Taxonomy). These skills are learned, practiced and assessed through relevant, real-world activities, as indicated by the level on the Application Model.

The Knowledge Taxonomy and Application Model form the Rigor/Relevance Framework™.

Gold Seal Lessons:

- Ensure academic rigor and teach students to use the knowledge they acquire.
- Are keyed to state standards and prepare students for high-stakes testing.
- Provide a vehicle for bringing teachers from different subject areas and grade levels together to talk about common ideas for improving instruction.
- Are usually multidisciplinary and can point the way to effective collaboration among faculty members.
- Can be stockpiled by a school, district or even state in resource banks to provide a plentiful source of ideas for teaching state standards.
- Are fun and intellectually and professionally satisfying to use.

## Using Gold Seal Lessons

The Gold Seal Lessons are based on state standards and matched to the high priority topics tested on state assessments. Teachers in every state should be able to find lessons that directly address state requirements.

In addition, the lessons are correlated to the highest rated topics in the International Center's National Essential Skills Study (NESS), which identifies the skills and knowledge needed by all students in their post-school lives.

Unique to this collection of Gold Seal lessons are strategies to assist English language learners. Of course, Quadrant D lessons are developed with all learners in mind, so these strategies are an added bonus to assist teachers in instruction.

Differentiated instructional strategies are included in all lessons for English language learners.

Every Gold Seal Lesson follows the same format and has the same components.

- **Title:** An attempt has been made to give the lesson interesting titles that may appeal to students.
- **Subject:** Each lesson is assigned to one of the four disciplines (English language arts, Math, Science, Social Studies) for organizational purposes and to assist in the correlation to Essential Skills. At the same time, because the lessons involve real-world tasks, they are typically interdisciplinary.
- **Grade:** The lessons are grouped to cover a grade span. Teachers will need to review the lessons in the relevant group to determine which one are most appropriate for their students' ability level.

- **Rigor/Relevance Framework:** Each lesson includes a graphic of the Rigor/Relevance Framework at the top of the lesson. Each lesson indicates that it is “D” quadrant, a high rigor/high relevance lesson.
- **Instructional Focus:** These statements describe the goals of the lesson. These statements correspond to the areas commonly found in state standards and help determine where the task fits within the curriculum.
- **Student Learning:** This is a list of what the students will be able to do as a result of the lesson activities. Teachers can give a quick review of the objectives prior to implementing the lesson.
- **Performance Task:** This is a clear and concise description of what the student is asked to do, generally in the context of a real-world situation. The task may be written as instructions to either the teacher or student. It also includes any special instructions for the teacher regarding materials, step up, or other resources needed.
- **Assisting English Language Learners:** Strategies for differentiating instruction are included in all lessons. These strategies can be integrated into each lesson at different stages of the lesson.
- **Essential Skills:** The International Center conducts nationwide surveys of curriculum topics to determine what educators and the general public believe are the most essential skills and knowledge for students to have acquired by the time they graduated from high school. The Curriculum Survey of Essential Skills, conducted in 1998, covered English language arts, mathematics and science. In 2007, the International Center launched the National Essential Skills Study (NESS), which included social studies. The survey’s primary purpose is to serve as a point of departure for a school or district to begin considering what must be taught in the limited number of hours available in the school year. Each lesson includes a list of related Essential Skills
- **Scoring Guide:** Each lesson includes a scoring guide. The scoring guide is a “measuring stick” for teacher and student. Both of them can use it to determine how well the student has mastered the skills and knowledge covered. The teacher can also use it to determine how well the lesson worked as well as for diagnostic purposes
- **Attachment:** Many of the lessons include additional resources for teachers. Handouts for students are referenced in the attachment section of the lesson. *All resources and attachments are included in the electronic version of the lesson provided on the enclosed CD.*

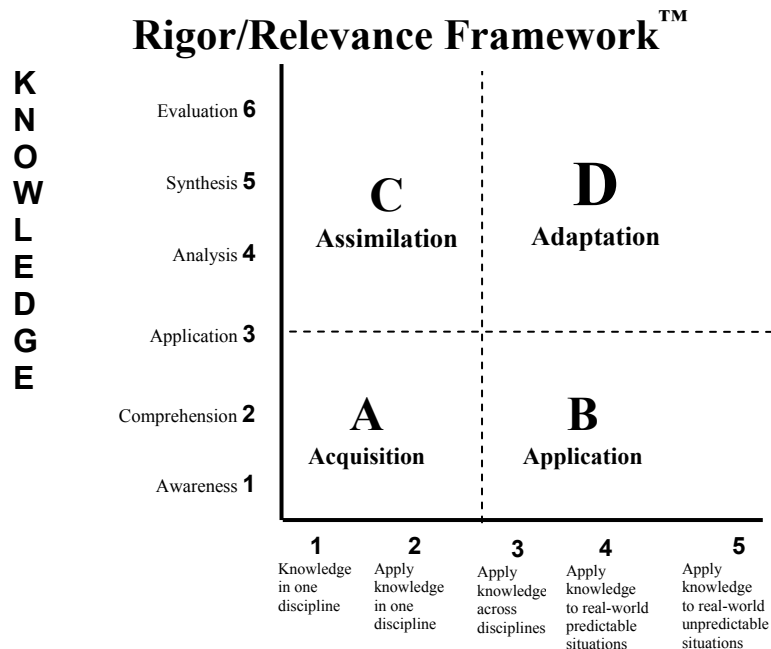


### **Rigor/Relevance Framework**

The Rigor/Relevance Framework, shown on the next page uses four quadrants that represent levels of learning. On the Knowledge axis, the framework defines low rigor as Quadrants A and B and high rigor as Quadrants C and D. On that axis, Quadrant A represents simple recall and basic understanding of knowledge for its own sake. Quadrant A is labeled “Acquisition” because students gather and store bits of knowledge and information.

Quadrant C, “Assimilation,” represents more complex thinking, but still knowledge for its own sake. In Quadrant C, students extend and refine their acquired knowledge to be able to use it automatically and routinely to analyze and solve problems and to create unique solutions.

Quadrants B and D represent action, or high degrees of application. In Quadrant B “Application,” students use acquired knowledge to solve problems, design solutions, and complete work.



In Quadrant D, “Adaptation,” students have the competence to think in complex ways as they apply knowledge and skills they have acquired to new and unpredictable real-world situations. Students create solutions and take actions that further develop their skills and knowledge.

For students to become lifelong learners, problem-solvers and decision-makers, Quadrant B and D skills are required. In effect, our students need to *know what to do when they do not know what to do*.

### Gold Seal Lesson Service

In 2003, the International Center developed a not-for-profit membership organization, the Successful Practices Network, as a way for K-12 educators to share strategies, practices, research, data and experiences. The Network continues to expand and connect hundreds of schools with services such as Collaborating Online for Rigor and Relevance (CORR) and the Gold Seal Lesson Service. Network schools use these tools to develop their own Gold Seal Lessons and also have access to more than 1,000 high-quality lessons in an online database.

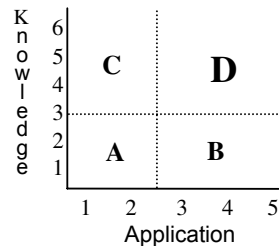
Member schools can submit draft lessons, which the Network reviews and revises if necessary to place them solidly in Quadrant D of the Rigor/Relevance Framework. Most lessons included in this resource kit were written by teachers who are Network members. To inquire about membership in the Network and the Gold Seal Lesson service, visit the Successful Practices Network website at [www.successfulpractices.org](http://www.successfulpractices.org).



## Creating an Original Piece of Drama

**Subject(s)**  
English, Drama

**Rigor/Relevance  
Framework**



**Grade Level** 10

### Instructional Focus

**Reading:** Students read a variety of grade level materials, applying strategies appropriate to various situations

**Writing:** Students write for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.

**Listening:** Students listen for a variety of purposes appropriate to the grade level.

**Speaking:** Students speak for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.

**Language Arts Integration:** Students synthesize individual language arts skills.

### Student Learning

- The students will create an original piece of drama that demonstrates their knowledge of the literary elements of theme, plot, characterization, setting, mood, and conflict.
- Students will demonstrate an understanding of the principles of the writing process, with an emphasis on expository writing.
- Through working in other curricular areas, students will develop skills in multiple intelligences by gathering and analyzing data, creating visual elements and music in their productions, and performing pieces of drama.

### Performance Task

#### Overview

The students will explore drama and expository writing in a real-world, rigorous, cross-curricular activity. The students will produce and promote an original piece of drama. Previews of student-scripted plays, movies, or television shows will be presented to other teachers, and the students will gather and analyze statistics and comments to compile a rating for their pieces of drama. Additionally, students will practice expository writing skills by composing two articles related to their films.

#### Description

**Introduction:** Organize class into production teams and present an overview of the unit to students: Groups will plan, promote, produce, and critique an original script. Groups may create a play, TV show, or movie. All scripts should be original and develop the elements of drama. All material must be appropriate for school and approved by the teacher. Films should not depict or advertise drugs, sex, or excessive violence. All activity captured on film must be legal.

**Preproduction meeting:** Provide time for students to develop story line, identify tasks, and designate responsibilities for accomplishing various aspects of the project.

---

**Performance Task**  
(con't.)

Script writing sessions (150 pts): Provide students with sample scripts and/or storyboard templates. Monitor group work as they write scripts. Remind students each script should clearly develop plot, conflict, setting, characters, and theme; and each script should be typed including the basic information about the setting, the actions of the characters, as well as the dialog for every character in the piece.

Production (100 pts): Make clear the expectations for the finished product and provide sufficient group time for students to work on the project. When appropriate, provide students with access to available technology.

Promotion (50 pts): Direct students to create an advertisement campaign for their productions, such as movie trailer, movie poster, or flyer. Remind students promotional material must include the title of their production, an image that relates to the theme or main idea of the piece, and an interesting tagline. Provide a venue for students to publish their promotional material.

Buzz Article (130 pts): Direct students to create and conduct their own surveys regarding the “buzz” created by their advertising campaigns. Facilitate the survey by organizing focus group of students and teachers who will rate the level of anticipation created by promotional material for the upcoming films. Require each group member to use this information to write a brief “buzz article” expressing the general interest surrounding their films.

Distribution: Facilitate distribution and viewing of films to groups such as volunteer teachers. Ask viewers to rate the films and make comments. The students will then examine this information to determine the overall rating of their films. The teacher comments may be used to create a film review.

Ratings/Reviews: Require students to share their work with people outside of the class and ask these viewers to act as critics of the film. Direct students to use information from the “critics” to place a rating on their films.

Review Article (130 pts): Require each student in the group to use the comments made by the “critics” to write a brief article advertising their movies.

Unit Total: 560 points

---

**Assisting English Language Learners**

The cooperative learning required in this project fosters social interaction and allows English language learners plenty of opportunities to interact with other students and practice English in a small group setting. This practice can help alleviate the anxiety felt by newcomers. To encourage participation, allow these students to choose at least one classmate in their group.

Encourage groups to use diversity as a resource for their dramatic works. Students with diverse cultural backgrounds have a wealth of unique stories and experiences to contribute to plot and character development. Encourage these students to share books, pictures, and music from their home countries for inspiration.

---

**Essential Skills**

- E41 Assess the significance and importance of themes in literary text.
  - E6 Collect and focus thoughts about the writing activity (brainstorming, listing, drafting, etc.).
  - E1 Apply writing rules and conventions (grammar, usage, punctuation, sentence structure, and spelling).
  - E9 Organize supporting detail in logical and convincing patterns that
-

## Essential Skills

(con't)

	focus on audience and purpose.
E45	Create an original piece of literature or poetry for personal enjoyment or to share with other readers.
E10	Participate in (sometimes leading) one-on-one or group discussions by asking questions, asking for clarification, taking turns speaking, agreeing and/or disagreeing courteously, making informed judgments, and working toward a common goal.
E21	Critically appraise print and nonprint content and information in current events, popular media, and the Internet for accuracy, artistic or informational value, production quality, and entertainment value.
E15	Demonstrate ability to select and use appropriate technology or media for presenting information to the target audience for the specific purpose.
E31	Apply an understanding of graphics, layout, white space, italics, graphs, charts, and other visual aids to enhance informational reading, writing, or presenting.
E50	Understand and apply film and theatrical terms and techniques to an analysis and evaluation of films and plays.

## Attachments/ Resources

- Drama Article Guide
- Buzz Survey
- Critic Rating

Submitted by: Luke Nielson, Edgewood-Colesburg Community School

### Scoring Guide

	10	5	1
<b>Title</b>	The title is clearly present in the advertisement. The title clearly relates to the theme or main idea of the piece.	A title is present in the advertisement. The title does not relate to the dramatic piece.	There is no title present.
<b>Tagline</b>	A creative tagline is created. The tagline relates to the theme of the piece and is clearly visible in the advertisement.	A tagline is created and present in the advertisement. The tagline does not relate to the theme of the piece.	There is no tagline present.
<b>Image</b>	One image or many images are present in the advertisement. The image(s) draw attention and clearly relate to the theme of the dramatic piece.	One image or many images are present. The images do not draw attention or clearly relate to the piece.	Images are not present in the advertisement.
<b>Additional Information</b>	Additional information such as names of directors or actors, release date, or other information related to the piece is present and clearly developed.	Additional information is provided. The information does not clearly relate to the dramatic piece.	Additional information is not included.
<b>Final Product</b>	The finished product is clean and professional. The advertisement is easy to understand.	The finished product is easy to understand, but appears distracting or unprofessional.	The finished product is confusing and unprofessional in appearance.

### Rubric for Script and Final Product

	<b>10</b>	<b>5</b>	<b>1</b>
<b>Purpose</b>	Production appears to accurately portray a fictional event in an interesting manner.	Production appears to portray a fictional story in an interesting manner. Specific events are often unclear.	Production does not appear to portray a fictional story. Specific events are unclear and uninteresting.
<b>Audience/ Tone</b>	The details and tone of the scripts are appropriate for the purpose and audience. All material is school appropriate.	At times the details and tone of the script are inappropriate for the purpose and audience. All material is school appropriate.	Details and tone of the script are inappropriate for the intended purpose and audience. Material is school appropriate.
<b>Content</b>	Content is interesting. Intended purpose is achieved. Specific details support the main idea of the script.	Content is interesting. Intended purpose is achieved. Specific details do not necessarily support the main idea of the script.	Intended purpose is not achieved. Details are unclear.
<b>Dialogue</b>	Dialogue is interesting and used to develop characters, create mood, and develop the plotline.	Dialogue is interesting but does not continually develop the elements of drama.	Dialogue of certain characters is not present. Dialogue does not contribute to the development of drama.
<b>Final Product/ Editing</b>	Final draft appears clean and professional. All necessary information is provided.	Final draft appears clean and professional. Some necessary information is not provided.	Final draft is not clean and professional. Necessary information is not provided.
<b>Conflict</b>	Conflict is clearly presented, developed, and resolved.	Conflict is stated and resolved. Conflict is not developed throughout the story.	Conflict is not present in the short story.
<b>Setting</b>	A setting is clearly presented. The setting contributes to the mood of the script.	A setting is clearly presented. The setting does not contribute to the mood of the script.	A setting is not clearly presented.
<b>Plot</b>	Exposition, rising action, climax, and falling action are all presented and developed.	All elements of plot are present. Elements are not clearly developed.	Elements or plot are not apparent.
<b>Theme</b>	A theme is clearly developed throughout the script.	A general theme appears to be present but is not clearly developed throughout the script.	No theme is apparent.

### Drama Article Rubric

	10	5	1
<b>Purpose</b>	Article appears to accurately present information related to the production as a promotion or review. Information is clear and easy to understand.	Article appears to accurately present information related to the production as a promotion or review.	Script does not appear to describe a fictional story. Specific events are unclear and uninteresting.
<b>Audience/Tone</b>	The details and tone of the scripts are appropriate for the purpose and audience.	At times the details and tone of the script are inappropriate for the purpose and audience.	Details and tone of the script are inappropriate for the intended purpose and audience.
<b>Content</b>	Writing is interesting. Intended purpose is achieved. Specific details support the main idea of the script.	Writing is interesting. Intended purpose is achieved. Specific details do not necessarily support the main idea of the script.	Intended purpose is not achieved. Details are unclear.
<b>Final Product</b>	Final draft appears clean and professional. All necessary information is provided.	Final draft appears clean and professional. Some necessary information is not provided.	Final draft is not clean and professional. Necessary information is not provided.
<b>Statistics/Comments</b>	Statistics and comments related to the video are accurately compiled and presented in the article. This information adds to the purpose of the article.	Statistics or comments related to the video are compiled and presented in the article. This information adds to the purpose of the article.	Statistics or comments are not included.
<b>Thesis</b>	A thesis statement is clearly developed and supported.	A thesis is clearly identified.	A thesis statement is not clear.
<b>Introductory Paragraph</b>	Introduction contains necessary background information and clearly identifies thesis. Introduction grabs the attention of the reader.	Introduction contains background information and states thesis. Information is underdeveloped.	Introduction does not provide necessary background information or state a thesis.
<b>Body</b>	Supporting details are clearly developed. All information supports thesis.	Supporting details are developed. Some evidence supports thesis.	Supporting evidence is not present.
<b>Closing Paragraph</b>	Thesis is clearly reemphasized. Supporting evidence is reinforced. A sense of closure is created.	Thesis is reemphasized. Supporting evidence is reinforced.	Thesis is not reemphasized. Supporting evidence is not reinforced.

### Grammar/Mechanics for Articles and Script

	10	5	1
<b>Mechanics, Grammar, Usage</b>	No significant errors in general mechanics, grammar, and usage of paper.	Three or fewer specific types of errors in general mechanics, grammar, and usage of paper.	More than three specific types of errors in general mechanics, grammar, and usage of paper.
<b>Spelling</b>	No spelling errors.	Five or fewer different spelling errors.	More than five different spelling errors.
<b>“Instant Message” Language</b>	“Instant message” language and jargon is not used in the paper.	Two or fewer types of “instant message” language or jargon used in paper.	More than two types of “instant message” language or jargon used in paper.
<b>Use of “Like”</b>	There is no unnecessary use of the word “like” in the paper.	The word “like” is unnecessarily used no more than three times.	The word “like” is unnecessarily used more than three times.

## Drama Article Guide

### Directions

Students will write two articles related to their dramatic piece. The articles should adhere to the form previously examined in class. This handout is to serve as a basic reminder of the structure to be used for the articles.

### Introductory Paragraph

Grab attention and provide necessary background information. Conclude the paragraph with the *thesis statement*.

### Body

Body paragraph(s) will be constructed with:

*topic sentence* (transitional information and main idea of the paragraph)

then

*supporting sentences*

then

*concluding sentence* (briefly summarize the information in the paragraph)

### Conclusion

Restate *thesis statement* (see introductory paragraph)

then

summarize main points and provide a sense of closure

# Buzz Survey

## Directions

After viewing the promotion, please fill out the title of the film and circle the appropriate number. This information will be used to determine the “buzz” created by each promotion.

Title: \_\_\_\_\_

Not interested		Interested		Very interested
1	2	3	4	5

Title: \_\_\_\_\_

Not interested		Interested		Very interested
1	2	3	4	5

Title: \_\_\_\_\_

Not interested		Interested		Very interested
1	2	3	4	5



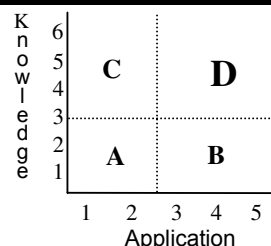


## How Fast Were You Going?

**Subject(s)**  
Mathematics

**Rigor/Relevance  
Framework**

**Grade Level** 9–12



### Instructional Focus

**Algebraic Concepts and Relationships:** Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation. Students evaluate and communicate the reasoning used in solving these problems.

**Problem Solving and Mathematical Reasoning:** Students apply a variety of problem-solving strategies to investigate and solve problems from across the curriculum as well as from practical applications.

**Basic Concepts and Knowledge:** Students develop an understanding of scientific concepts using facts, theories, principles, and models.

**Science in Personal and Social Perspectives:** Students apply scientific principles to personal and social issues.

**Reading:** Students read a variety of grade level materials, applying strategies appropriate to various situations.

**Writing:** Students write for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.

**Listening:** Students listen for a variety of purposes appropriate to the grade level.

**Speaking:** Students speak for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.

### Student Learning

- Students will apply algebraic formulas to a problem-solving situation, substituting values and solving equations.
- Students will relate algebraic concepts to formulas and concepts studied in physical science classes.
- Students will apply the quadratic formula in a real-world problem.

### Performance Task

#### Overview

Students will evaluate data gathered at a traffic accident and use authentic data and formulas to determine the coefficient of friction and minimal initial speed of the vehicles involved in the traffic accident.

#### Description

Give each student the How Fast Were You Going? Activity Packet. Tell students they will take the role of district attorney or defendant and testify in court as to how fast the vehicles involved in the accident were traveling before impact.

Give the students various formulas that can be used to determine the initial speed of the accident vehicles before impact. Students must algebraically manipulate the formulas with given values for the variables to determine the missing information. In some cases, this will involve the use of the quadratic formula.

Students will work in groups to design a process to use for gathering evidence for the case (before giving the facts of the case to them). The product should be a general process rather than a solution based on specific facts. This is assessed as part of the grade.

---

## Performance

### Task

(con't.)

The teacher should develop files that contain a “police report” of the accident. The file should contain the coefficient of friction, make of the car, type of tire, weather conditions, and date of the accident. Students could actually research the weather conditions on that date to gather additional evidence. Break the class into an even number of groups. Two groups will work on one case, with one group representing the defense and one group representing the prosecution. Each group will work to reconstruct the accident and to present its case in “court.” Presentation time is 10 minutes and should include visuals.

*Slide-to-Stop Formula.* This is an alternate formula that some students may find and use. When there is a major motor vehicle accident, an accident reconstructionist is often called in. One of the most critical pieces of information needed is the velocity of each vehicle. This is used to determine if the speed limit was broken and if speed was a contributing factor to the accident. In a fatality, speeding can result in a driver being prosecuted for manslaughter (a felony) or negligent homicide (a misdemeanor), or the driver may not be charged at all. The main formula that officers use is the slide-to-stop formula:  $v = 15.9 (d u n)^{1/2}$ .  $d$  is the length of the skid marks in meters, and  $u$  is the coefficient of friction of the roadway and the tire,  $n$  is the percentage of tires that braked, and  $v$  is the minimum initial speed needed to travel the skid mark distance. An automobile must have its brakes fully locked to leave skid marks. Therefore, the minimum traveling speed before slamming on the brakes can be found.

Note: If you can find it, *The Manual for Traffic Accident Investigators* by [J. Stannard Baker](#) and [Lynn B. Fricke](#) is a good source of information about this topic. It is listed on Amazon.com for under \$10.

---

## Assisting English Language Learners

English language learners frequently have difficulty with multistep directions. Help students follow complex instructions and keep track of their progress during an activity by giving them a checklist that will reinforce the proper sequence of activities. For this lesson, consider making a worksheet or chart out of the following steps. Leave a column or extra space for students to take notes, write formulas, and draw pictures to help with comprehension:

1. Complete the practice problems to gain familiarity with the vocabulary, the formulas, and the variables involved.
2. Work in a group to design a general process that can be used to gather evidence for a traffic accident case.
3. Read the police report to find data such as the coefficient of friction, make of the car, type of tire, weather conditions, and date of the accident.
4. Determine if your group will represent the defense or prosecution.
5. Use the data from the police report and relevant formulas from the activity packet, reconstruct the accident by determining:
  - initial speed
  - perception distance
  - braking distance
  - total stopping distance
6. Write a 10-minute presentation with visuals.
7. Present the case in to the “court.”

---

## Essential Skills

M11 Apply variables in expressions and equations to solve problems (i.e., write mathematical equations for given situation, create a mathematical model to understand the relationships between variables, or make connections between the structures of mathematically abstract concepts and the real world).

---

---

**Essential Skills**

(con't)

- M7 Simplify and solve algebraic equations by identifying and using the correct order of operations and techniques necessary to carry out the solution.
- M27 Find the solution of linear equations and inequalities where the variable appears on either or both sides and in which one or both sides must be simplified before solving the equation (e.g., solve  $x + 2(x - 3) = -4x + 5$  for  $x$ ).
- E4 Use resources (dictionary, grammar books, thesaurus, online references, etc.) as needed to edit.
- E7 Research information from a variety of sources and draft a well-organized, accurate, and informative report or essay that engages an audience and addresses its needs.
- E9 Organize supporting detail in logical and convincing patterns that focus on audience and purpose.
- E14 Write clear and concise directions or procedures.
- E10 Participate in (sometimes leading) one-on-one or group discussions by asking questions, asking for clarification, taking turns speaking, agreeing and/or disagreeing courteously, making informed judgments, and working toward a common goal.
- E31 Apply an understanding of graphics, layout, white space, italics, graphs, charts, and other visual aids to enhance informational reading, writing, or presenting.
- E32 Evaluate the logic and organization of technical or other nonfiction texts for clarity and effectiveness in describing a set of directions or procedures.
- S61 Understand and apply kinematics (i.e., the mathematical methods of describing motion, including velocity, acceleration, and displacement, without regard to the forces that produce it) to solve problems.

---

**Attachments/  
Resources**

How Fast Were You Going? Activity Packet

---

Submitted by: Mathematics Department, Iroquois Central High School

## Scoring Guide Analytic – Basic Version

<b>Algebraic competency</b>	<b>Score _____</b>
4 Points = Student applies the quadratic formula correctly and solves accurately. Student correctly substitutes values for variables and evaluates algebraic formulas. Student shows equation-solving steps neatly and appropriately.	
3 Points = Student demonstrates that he or she understands the concepts listed above, but processes may contain some arithmetic errors and may not show sufficient work to illustrate the steps used.	
2 Points = Student can manipulate linear equations accurately to solve problems but does not show sufficient knowledge of how to apply the quadratic formula to solve problems.	
1 Point = Student shows only minimal evidence that he or she can apply algebraic concepts when solving problems.	
<b>Developing an investigative process based on gathering mathematical evidence</b>	<b>Score _____</b>
4 Points = Student works with a group to establish a logical list of required data and to create a well-written process that an investigator should follow to gather this evidence.	
3 Points = Student works with a group to do the things described above, but the written product could contain more details and clarity.	
2 Points = Student works with a group to do the things described, but many details are missing and the written process lacks details and is difficult to understand.	
1 Point = Student contributes little to the group process or refuses to participate.	
<b>Group presentation</b>	<b>Score _____</b>
4 Points = The presentation is clear, organized, contains visuals, and contains accurate interpretations of the data.	
3 Points = The presentation is clear, organized, and contains visuals but is not entirely accurate.	
2 Points = The presentation is somewhat disorganized and not entirely accurate but does contain all required elements.	
1 Point = The presentation is disorganized, lacks visuals, and does a poor job of explaining the data.	

## Activity Packet



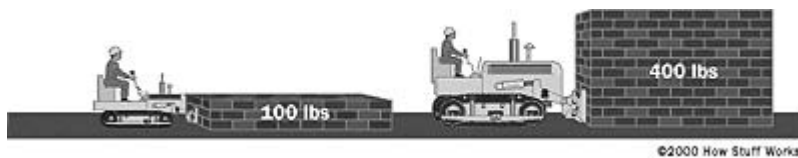
How fast were you going??

When traffic accidents occur, the people involved might end up in a court case. Sometimes this happens because the driver sues the state or county to show that the roads, bridges, or intersections were defective. Other times, the driver claims that he or she was following all of the traffic laws, but the police claim that the accident was caused by excessive speed.

Attorneys for both sides try to use scientific facts to plead their cases. Read through the following explanations of some of the science that is used:

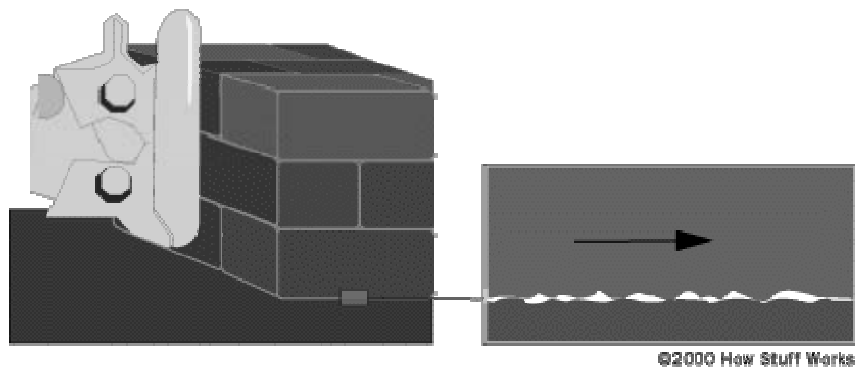
### Coefficient of Friction

*Friction* is a measure of how hard it is to slide one object over another. Take a look at the figure below. Both of the blocks are made from the same material, but one is heavier. We all know which one will be harder for the bulldozer to push.



Friction force versus weight

To understand why this is, let's take a closer look at one of the blocks and the table:



Friction at the microscopic level

Even though the blocks look smooth to the naked eye, they are actually quite rough at the microscopic level. When you set the block down on the table, the little peaks and valleys get squished together, and some of them may actually weld together. The weight of the heavier block causes it to squish together more, so it is even harder to slide.

Different materials have different microscopic structures; for instance, it is harder to slide rubber against rubber than it is to slide steel against steel. The type of material determines the *coefficient of friction*, the ratio of the force required to slide the block to the block's weight. If the coefficient were 1.0 in our example, then it would take 100 pounds of force to slide the 100-pound (45 kg) block, or 400 pounds (180 kg) of force to slide the 400-pound block. If the coefficient were 0.1, then it would take 10 pounds of force to slide to the 100-pound block or 40 pounds of force to slide the 400-pound block.

The coefficient of friction is usually determined through experimentation with actual objects, but in most accident investigations, the coefficient of friction between tires and pavement is about 0.33 for dry pavements and 0.6 for wet pavements. The variable,  $f$ , is normally used to represent the coefficient of friction.

$$\text{dry pavement} \rightarrow 0.33 \leq f \leq 0.6 \leftarrow \text{wet pavement}$$

### Initial Speed

The *initial speed* is the speed at which the car was traveling just before applying the brakes. The variable used to represent initial speed in an accident investigation is usually  $V$ .

### Perception Distance

The *perception distance* is the distance traveled between seeing an obstacle and applying the brakes. You might want to experience this gap by using an interactive applet that can be found on the Internet at <http://www.phy.ntnu.edu.tw/ntnujava/viewtopic.php?t=224>.

The formula for perception distance is normally equal to the product of  $1.47tV$ . We already know that  $V$  is the initial speed of the vehicle. The variable,  $t$ , is normally assigned a value of 2.5 seconds in accident reports.

$$\text{perception distance} = 1.47tV$$

$$t = \text{perception time} + \text{reaction time}$$
$$t \approx 2.5 \text{ seconds}$$

### Braking Distance

The *braking distance* is the distance the car would travel after the brakes are applied. You can see that braking distance is dependent on the initial speed of the car,  $V$ , and the coefficient of friction,  $f$ , between the tires and the pavement.

$$\text{braking distance} = \frac{V^2}{30f}$$

## Total Stopping Distance

The total distance needed to stop the car is the sum of the perception distance and the braking distance.

$$\text{Total stopping distance} = 1.47tV + \frac{V^2}{30f}$$

In an accident investigation, the police actually drive a “skid” truck at the accident scene to measure the coefficient of friction. There are many things that can affect the coefficient of friction between a tire and the pavement:

- Was the pavement wet or dry?
- Were the tires rotating or did they lock up?
- What was the design of the tire tread?
- How worn was the tire tread?
- What were the energy-absorbing characteristics of the tire?
- What were the energy-absorbing characteristics of the pavement?

## Practice Problems

1. What is the total stopping distance when the initial speed is 50 mph and the coefficient of friction is 0.6? Show your work!

*(You should get 575.85 feet)*

2. What is the total stopping distance when the initial speed is 30 mph and the coefficient of friction is 0.33? Show your work!

*(You should get 201.15 feet)*

3. The police reconstructed an accident, and by measuring skid marks and measuring the coefficient of friction, they determined the total stopping distance to be 400 feet. If the coefficient of friction was 0.33, what was the initial speed of the car? Show your work!

*(Hint: you will have to use the quadratic formula to find the initial speed. You should get around 47 mph depending on how and when you round.)*

### Accident Reconstruction Project



*For the Prosecution or for the Defense?*

Directions:

1. Your teacher will assign you to a group. Your group will be designated as “prosecutor” or “defendant.”
2. To prove your case, your group must first design a written investigation process to use that is designed to give you the evidence that you need. Generate a list of things that should be investigated, among them the initial speed of the vehicle and the coefficient of friction between the tires and pavement. You may certainly include other factors into your investigation, such as weather, tire specifications, and so forth. If you can find alternative valid methods of calculating initial speed, you may use them, if they are documented.

Start with the list and then write the one-page investigation process that explains exactly what the accident reconstructionist should do.

3. Your teacher will provide you with an accident report from the police officer who was on the scene.
  - If your group represents the defendant, you will be trying to make a case that makes the facts look as favorable to you as possible.
  - If your group represents the prosecution, you will be trying to prove that the accident was caused by negligence on the part of the driver.
4. Follow the investigation process that you wrote for #2 to gather the needed evidence. Work with your group to analyze the data and to prepare your mathematically based arguments for court.
5. You will be given a date for your appearance in court. Both the prosecution and the defense should be prepared to present their evidence and to try to prove their case on that day. Your group can use any presentation method from PowerPoint to posters to photos, but it is required that mathematics be used to support your argument. Each group will have a maximum of 10 minutes for its presentations.
6. Your grade will be determined by using the rubric that the teacher will post prior to the beginning of this project.

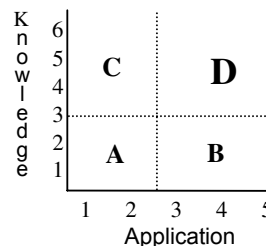
**GOLD  
SEAL  
LESSON**



**Evaluating Energy Resources**

**Subject(s)**  
Environmental  
Science, Physics,  
Chemistry  
**Grade Level** 9–12

**Rigor/Relevance  
Framework**



**Instructional  
Focus**

**Writing:** Students write for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.  
**Basic Concepts and Knowledge:** Students develop an understanding of scientific concepts using facts, theories, principles, and models.  
**Unifying Concepts and Processes:** Students recognize patterns and processes, making connections in terms of systems and subsystems that explain the interrelationships of the natural and designed world.  
**Habits of Mind:** Students develop habits of mind including curiosity, open-mindedness, and persistence.  
**Communication:** Students communicate and apply scientific concepts.  
**Science in Personal and Social Perspectives:** Students apply scientific principles to personal and social issues.  
**History and Nature of Science:** Students develop an understanding of the nature of science, its history, and science as a human endeavor

**Student  
Learning**

- Students will conduct research that will result in further understanding of energy resources in terms of the advantages and disadvantages to the environment of each resource, current use in the United States, and the potential for future growth use.
- Students will write reports that support their understanding and compare and discriminate the environmental impacts of energy resources.
- Students will use a variety of scientific sources to provided evidence to support their position.
- Students will demonstrate cooperative skills by working in teams to assemble information for a presentation.
- Team presentations will include computer application of Power Point slide shows, as well as role playing with the audience.
- Students will evaluate each energy resource and rank them for potential use.
- Students will complete a unit test to demonstrate mastery of the unit.

**Performance  
Task**

**Overview**  
Students will work together in teams of three or four to research and submit a written report containing information on an energy resource that will be assigned by the teacher. Students will then present this information to the class as part of a Power Point presentation where they will assume the role of an energy sales team in an attempt to win an energy contract and sell their services to a local municipality.

**Description**  
The teacher will assign each group one of the following research topics: (a) fossil fuels, (b) nuclear energy, (c) hydroelectric power, (d) wind power, (e) organic

---

## Performance

### Task

(con't.)

fuels, or (f) hydrogen fuel cells.

Each team will use a variety of reference materials including textbooks, newspaper articles, and online resources to gather the following information:

1. Brief description of the energy resource and how energy (kinetic) is created in this situation, as per the first law of thermodynamics. Include at least two simple illustrations to help your audience's comprehension of this description.
2. What percentage of our national energy needs is being met by this particular resource today?
3. Present a line graph that shows the overall use of this energy resource in the United States over the last 50 years.
4. What is the potential for growth of this resource? Present a line graph that shows a projection of the future use of this resource over the next 50 years.
5. What are the advantages and disadvantages of using this resource? This may include factors such as pollution potential, availability, cost of production, and existing infrastructure.
6. In your opinion, do the benefits outweigh the environmental costs of using this particular energy source? Support your argument with two specific examples pertaining to the topic.

Members of the team will then present their information to the teacher in a written report. The teams will assemble their information into a PowerPoint presentation that they will present to the class as part of a role-playing exercise. The presenting team will assume the role of a sales team from a large energy company that is competing for the energy contract to supply electricity to the local municipality. The sales team will create a name and logo for their company, as well as designate a team leader to run the presentation. The audience will assume the role of the town board, which will evaluate each energy resource for use in its town.

The audience is encouraged to ask questions at any time during the presentation. The sales team therefore will need to designate an "expert" in their group to respond to specific questions. This is easily done by each person on the team taking responsibility for one or two of the questions above that formed the presentation. The team leader will take questions from the audience and defer to the team "expert" in the area corresponding to the question for the response.

Copies of the presentation will be made available to all other class members at the time of the presentation. Teacher will allow time after each presentation for a Q & A session if necessary.

A teacher-made test with multiple-choice questions generated directly from student presentations will be administered at the completion of the unit. This test will also include the following free-response activity:

You as the information director for the town are in charge of creating a report that evaluates all six energy resources by ranking them in order from 1 (the most desirable) to 6 (least desirable). You need to identify one advantage and one disadvantage for each energy source and present a brief analysis of your number 1 selection to support your assessment of rank.

Students should be made aware of this free response question before the exam so as to have time to construct an articulate response.

---

---

**Assisting English  
Language Learners**

After students conduct their research, take a break to check for comprehension. Have the groups do a brief roundtable “pass-and-share” activity. Students pass around a blank sheet of paper, and each student writes or draws one thing he or she learned from the research. They should pass the paper two or three times to capture as many concepts as possible.

---

**Essential  
Skills**

- E1 Apply writing rules and conventions (grammar, usage, punctuation, sentence structure, and spelling).
  - E9 Organize supporting detail in logical and convincing patterns that focus on audience and purpose.
  - E7 Research information from a variety of sources and draft a well-organized, accurate, and informative report or essay that engages an audience and addresses its needs.
  - E10 Participate in (sometimes leading) one-on-one or group discussions by asking questions, asking for clarification, taking turns speaking, agreeing and/or disagreeing courteously, making informed judgments, and working toward a common goal.
  - S7 Examine how humans, through technology, cause environmental change by disrupting the equilibrium or balance of nature. Critique ways to improve environmental protection through education, research, laws, and conservation and judge the effectiveness of conservation practices and preservation techniques on environmental quality.
  - S52 Understand and compare energy transformations in living systems, geological systems, and artificial systems constructed by humans.
  - S21A Compare and investigate various types of energy (e.g., heat, light, electromagnetic, nuclear, internal, wave, potential vs. kinetic) and energy transfer and know how to apply measurements of energy.
  - M30 Know and apply the components and properties of the rectangular coordinate system: x–y axis, origin, quadrants, abscissa (x-coordinate) and ordinate (y-coordinate), and general representation of a point (x,y).
- 

**Submitted by:** Sean Campbell, Lyman High School

## Scoring Guide

<b>Written report: 25 points</b>	<b>Score</b> ____/25
20–25 points: All six informational points are addressed completely and clearly. Graphs and illustrations are present and of high quality and accuracy. Student shows sound reasoning and support for point #6.	
10–20 points: Student addresses all six points, but some points are incomplete and/or unclear. Graphs do not show a high degree of accuracy and illustrations are of poor quality. Student shows good reasoning skills for point #6 but only offers one example for support.	
0–10 points: Student does not address all six informational points. Graphs and illustrations are missing, or of poor quality. Student shows poor reasoning skills and no supporting examples for info point #6.	
<b>Power Point Organization, Quality, Individual Contribution: 25 points</b>	<b>Score</b> ____/25
20–25 points: Presentation moves smoothly and efficiently through the information. High degree of organization with clearly produced slide frames that contain zero spelling or grammatical errors. Individual was an active participant.	
10–20 points: Presentation contains slides that lack of clarity and do not move smoothly through the information. Some spelling or grammatical errors are present. Individual had a somewhat limited role in the creation of the presentation.	
0–10 points: Presentation is highly disorganized with several spelling and grammatical errors. Individual had no role in creating the presentation.	
<b>Sales Team Participation and Quality of Oral Responses: 25 points</b>	<b>Score</b> ____/25
20–25 points: Actively participates in presentation and gives well-prepared, clear responses to questions. Demonstrates “expert” knowledge of information that he/she is responsible for.	
10–20 points: Limited participation. Responses are somewhat incomplete and not completely clear. Demonstrates moderate working knowledge of information.	
0–10 points: Very limited to no participation. Responses are confused and very incomplete. Demonstrates minimal knowledge of information.	
<b>Unit Test: 25 points</b>	<b>Score</b> ____/25
15 multiple-choice questions worth 1 point = ____/15 pts Extended response question worth 10 points: ____/10 2 points ranking 1–6 2 points for correct advantage 2 points for correct disadvantage 2 points for analysis 2 points for spelling and grammar	
<b>Total Score</b>	<b>____/100</b>

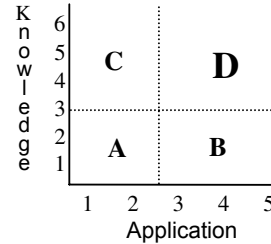
**GOLD  
SEAL  
LESSON**



**Why We Needed a New Constitution**

**Subject(s)**  
U.S. History and  
Government  
**Grade Level** 11

**Rigor/Relevance  
Framework**



**Instructional  
Focus**

**Reading:** Students read a variety of grade level materials, applying strategies appropriate to various situations.  
**Writing:** Students write for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.  
**Listening:** Students listen for a variety of purposes appropriate to the grade level.  
**Speaking:** Students speak for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.

**Student  
Learning**

- Students will work in groups to analyze necessary changes made to the Articles of Confederation.
- Students will develop an understanding of the difficulties faced by the framers of the U.S. Constitution.
- Students will analyze the current Constitution and how it handles present day issues to evaluate it's effectiveness.

**Performance  
Task**

**Overview**  
Background readings will set the stage for understanding the frustrations of the framers of the Constitution. Small student groups will analyze the changes that were necessary to deal with financial matters, executive power, lawmaking, and security and then present their findings to the class.

**Description**  
Although the Articles of Confederation had allied the 13 colonies during the American Revolution, they proved to be insufficient for the needs of the newly independent American states. Instead of modifying the Articles, the delegates made significant compromises to solve the problems they confronted and produced a new document. Students will develop an understanding of the difficulties faced by the framers of the U.S. Constitution in trying to meet the needs of the individual states as well as the national government.

Students will be assigned readings dealing with the major events that occurred under the Articles of Confederation. Examples include the War for Independence, Treaty of Paris, Shay's Rebellion, and Northwest Ordinance. Students will gather information from these readings and save the data in bulleted list format. They should also take notes during the other group presentations.

Students are then divided into groups of three and assigned one of the following topics:

- Financial issues                      Law making
- Executive power                      Security

Each group is to research and address the assigned topic, first in examples under the Articles of Confederation and then as those examples came to be treated

---

**Performance Task**  
(con't.)

under the U.S. Constitution. Each member of the group should present one part of the assignment to the rest of the class. Each group should submit a proper bibliography citing all sources consulted.

Finally, group members are to brainstorm and identify several examples of current state and or national situations that fall under the assigned topics (financial issues, law making, executive power, or security). One member of the group should describe to the class the means by which each case will be resolved.

Scoring of the lesson will be based on the attached rubric (“Why a New Constitution?”).

---

**Assisting English Language Learners**

Help English language learners use their textbook as a resource for understanding the events leading up to the U.S. Constitution. Students may need assistance understanding the organization and features of their textbooks.

Have students preview the chapter by reading the titles and headings. Ask them to predict what each section will include. After they read a section to confirm the topic, have them restate the heading in their own words.

Work with students to identify and explain the following textbook features:

- Illustrations and pictures
- Graphs, charts, and tables
- Footnotes
- Vocabulary words and definitions (and other bold type)
- Maps
- Timelines
- Chapter summary
- Study questions
- Index
- Glossary

Even if students are unable to read all of the words in a textbook chapter, they will be able to glean substantial information from graphics and categorized lists and charts.

---

**Essential Skills**

- SS5 Describe the U.S. Constitution and why it, or any constitution, is important.
  - SS54 Compare the purposes, sources of power, and effectiveness of various governments around the world to each other and to those outlined in the U.S. Constitution.
  - SS3 Examine the purpose of rules and laws, explain how governments enact and enforce them, and assess ways to evaluate rules and laws.
  - SS28 Solve problems effectively by characterizing a problem through identification of variables and relationships and moving to a solution.
  - E4 Use resources (dictionary, grammar books, thesaurus, online references, etc.) as needed to edit.
  - E7 Research information from a variety of sources and draft a well-organized, accurate, and informative report or essay that engages an audience and addresses its needs.
  - E3 Follow oral directions.
  - E2 Read for main ideas and supporting details and discriminate important ideas from unimportant ideas to aid comprehension.
  - E1 Apply writing rules and conventions, (grammar, usage, punctuation, sentence structure, and spelling).
  - E8 Prepare and deliver individual speeches that address the needs of the target audience by gathering information, rehearsing, making eye contact,
-

---

**Essential Skills**

(con't)

- speaking loudly enough, and delivering information in a well-organized fashion.
- E9 Organize supporting detail in logical and convincing patterns that focus on audience and purpose.
- E14 Write clear and concise directions or procedures.
- E18 Apply rules of appropriate diction and grammar in formal and informal speaking situations.
- E10 Participate in (sometimes leading) one-on-one or group discussions by asking questions, asking for clarification, taking turns speaking, agreeing and/or disagreeing courteously, making informed judgments, and working toward a common goal.
- E33 Define a position on a controversial topic and write an essay to persuade a specific audience to change an opinion or take a particular action.
- E36 Define a position on a controversial topic and make an oral presentation likely to persuade a specific audience to change an opinion or take a particular action.
- E26 Use ideas from different sources to write a paper that expresses a personal opinion or uses specific evidence from literary texts to support an opinion.
- E20 Understand the nature and purpose of a variety of technical formats (essays, business letters, memos, investigative reports, brochures, critiques, instructions, policy statements, technical proposals, lab reports, etc.) and write in these formats.
- E6 Collect and focus thoughts about the writing activity (brainstorming, listing, drafting, etc.).
- E21 Critically appraise print and nonprint content and information in current events, popular media, and the Internet for accuracy, artistic or informational value, production quality, and entertainment value.
- 

**Submitted by:** Colleen McCoy and Julie Muskopf, Iroquois High School

## Scoring Guide

### Why a New Constitution?

Category	Outstanding	Good	Satisfactory	Poor
Information	All information presented was clear and accurate.	Most information presented was clear and accurate.	Some information presented was clear and accurate.	Information presented had inaccuracies or was incomplete.
Understanding of topic	Thorough treatment of all aspects of the assignment.	Thorough treatment of most aspects of the assignment.	Thorough treatment of some aspects of the assignment.	Failed to demonstrate an adequate treatment of the topic
Participation	Each member was actively and properly involved.	Most members were actively and properly involved.	Some members were actively and properly involved.	Few members were actively and properly involved.
Presentation style	Team consistently used gestures, eye contact, tone, and enthusiasm in a way that kept the attention of the audience.	Team generally used gestures, eye contact, tone, and enthusiasm in a way that kept the attention of the audience.	Team sometimes used gestures, eye contact, tone, and enthusiasm in a way that kept the attention of the audience.	Team members failed to present in a way that kept the attention of the audience.
Bibliography	Proper citations for all sources.	Proper citations for most sources.	Proper citations for some sources.	Improper citations.