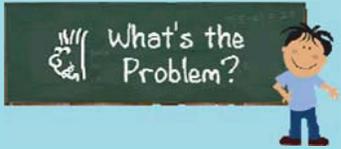
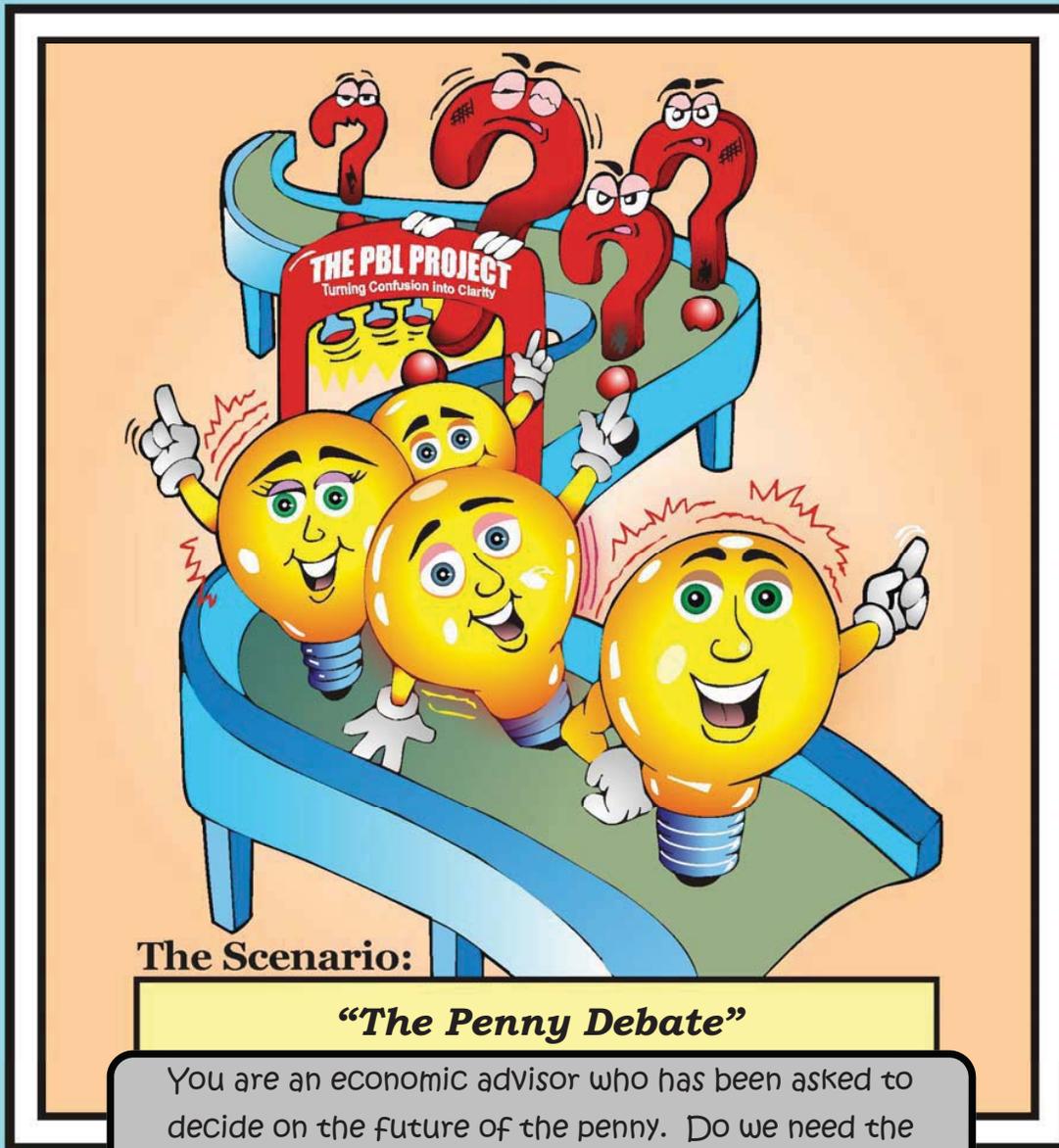


THE PBL PROJECT

Problem-Based Learning. Done Right. Finally.



Integrated Problem Scenarios
Middle School / Secondary



The Scenario:

“The Penny Debate”

You are an economic advisor who has been asked to decide on the future of the penny. Do we need the one-cent coin, or is it time to get rid of it?

- * Features engaging and real-world scenarios
- * Integrates all core subjects
- * Includes all teacher and student resources
- * Provides a full overview of Problem-Based Learning

Problem-Based Learning. Done Right. Finally.

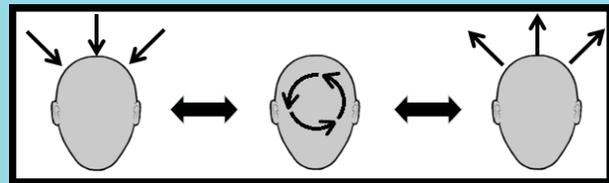
It's an important part of an educator's job to make sure students leave the classroom fully prepared for their lives ahead and equipped with 21st century skills (i.e. skills that focus on communication, organization, technology, and problem-solving). We use these skills every day. Unfortunately, they are often overlooked as students work to absorb names and dates, facts and figures.

That's why **Problem-Based Learning** is so important. It allows students to tackle a scenario that goes beyond a "yes" or "no" answer. In doing so, students will review a variety of resources related to the topic (articles, videos, statistics, infographics, etc.), engage in classroom discussion, and organize their thoughts as they evaluate the information. After all this, they will have a chance to respond to the challenge and defend their approach.

It won't be easy, but it will be very engaging. Best of all, this process will help develop a wide variety of skills that students will use the rest of their lives!

The 1-2-3 of Problem-Based Learning

When faced with any problem, challenge, or situation, students need to be prepared to:



Step 1
Absorb the
information

Step 2
Evaluate the
information

Step 3
Generate the
response

This book will walk teachers and students through the following Problem Scenario:

The Main Problem Scenario:

You are an economic advisor who has been asked to decide on the future of the penny. Do we need the one-cent coin, or is it time to get rid of it?

You will approach this Main Problem from several points-of-view

The Math Angle

Does the penny cost more than it's worth?

The Science Angle

What materials and resources are used in the process of making the penny?

Social Studies Angle

Does the penny serve an important economic purpose in our monetary system?

In the end, you will take all you've learned and give your final response to the Main Problem.



Language Arts serves as the hub for the entire exercise. It is in ELA that all of the other "subject angles" are evaluated and measured against one another, and a final decision about how to approach the Main Problem is made based on all of the available information.



A Note to the Teacher:

If there was something about the cover or title of this book that interested you enough to pick it up and turn to this page, then you probably already know what we are going to say. The truth is that, in today's world, students must leave the classroom equipped with 21st century skills and ready to meet the challenges of real life. One of the best ways to meet these demands is through interdisciplinary **Problem-Based Learning** scenarios. This type of classroom instruction promotes communication, collaboration, curiosity, organization, and problem-solving skills . . . all major components of any reputable set of standards.

The Problem-Based scenarios in this book integrate Language Arts, Math, Social Studies, Science, and other content areas. They offer educators a chance to shift the work of learning from the teacher to the students, where it belongs. If we wish to prepare a generation of students to solve real-world problems, we simply must give them real-world problems to solve... Problem-Based Learning is the way to accomplish this task.

So, let's get ready to begin! Enjoy,

Your Friendly Editors

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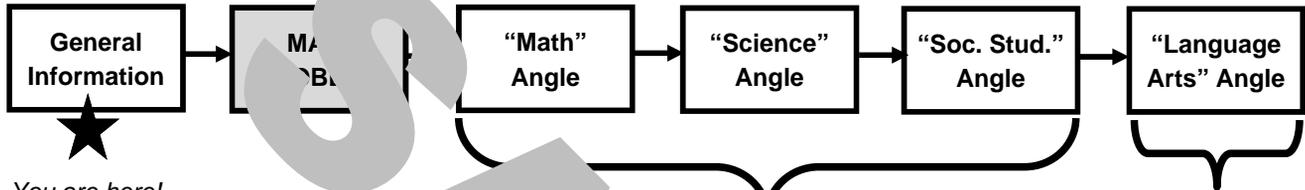
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How does this book work?

This book is divided into several sections, listed below in the order in which they will appear:



You are here!

We will look at the Main Problem from several points-of-view, each conveniently directed to a core subject area.

Language Arts serves as the "hub," where students will use all points-of-view to provide a comprehensive response to the Main Problem.

This "subject angle" format works well because the goal is to simulate a real-world scenario within a school setting. As the illustrations below suggests, they do not always replicate one another.

School =



Think of it like this...

This is your MAIN PROBLEM SCENARIO.

You need to buy a new car. Which car is the best fit for you and your situation?

Which is the most cost-effective car?

Which is the most practical car?

Which is the coolest car?

These are the different perspectives from which it's necessary to approach the Main Problem. In our scenario, these perspectives will all fit nicely into a core subject area and are referred to as the "subject angles."

So, which car are you going to buy?

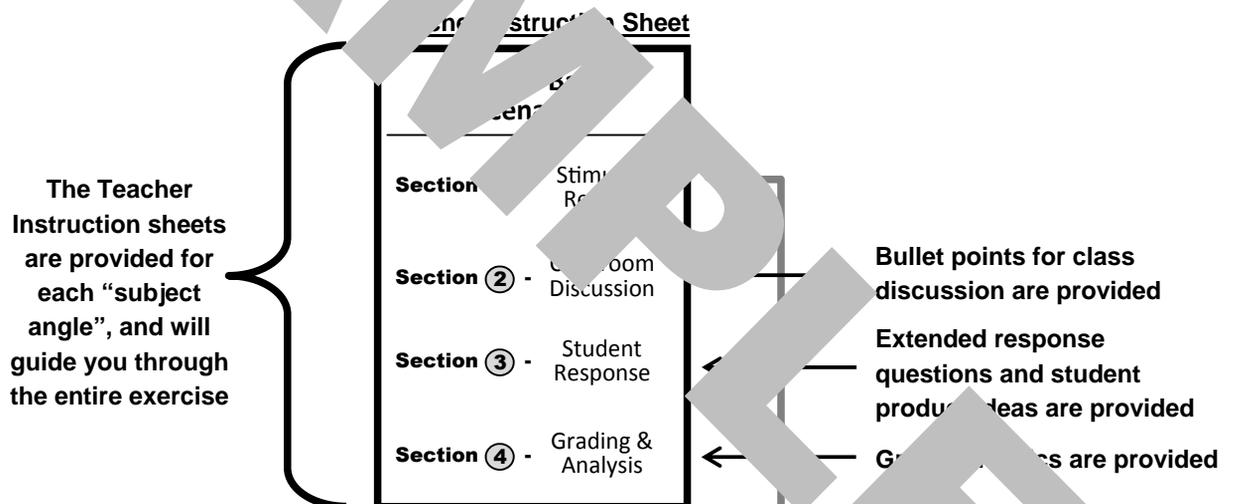
In the end, the different perspectives must be evaluated to provide a single response to the Main Problem. In our exercise, this comprehensive answer is provided in the Language Arts section.

What is provided?

The short answer is “everything you need!”

As you work through the Problem-Based Scenario in this book, both you and your students will be provided with the necessary resources each step of the way.

Teacher Resources



Student Resources

- Stimulus Items (*articles, videos, infographics, statistics, etc.*) are all provided for each exercise
- “Thought-Gathering” sheets are provided to help students organize their ideas
- Handouts are provided to introduce and layout the instructions for all steps of each exercise

Remember, a unique set of all of these resources will be provided for each “subject angle”

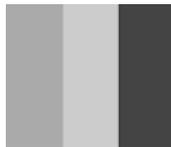
The Main Problem:

Here is the Problem-Based Learning scenario that is the focus of this guide:

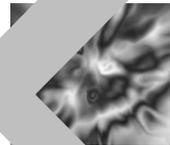
You are an economic advisor who has been asked to make a recommendation about the future of the penny. The one-cent coin is the smallest currency we have in circulation and what you can buy with it goes down every year. It has been argued that it's time to get rid of the penny while others feel that choice would have a negative impact. What is the correct course of action?

Of course, every significant challenge in life needs to be looked at from several points-of-view. For the Problem-Based Scenario in this guide, the different "points-of-view" have been divided into a math angle, a science angle, and a social studies angle. Then, in Language Arts, all points-of-view are evaluated into one approach.

Obviously, life isn't so cleanly divided into subject areas. Remember the visual that you saw on page 12:



School



Life

It's certainly a challenge—impossible, actually—to have "real life" crunched to a box that fits the academic schedule. Still, having students review a problem from several angles (even if they are neatly divided along subject lines) helps them understand that problems are multi-dimensional, made up of pieces so complex that they must be evaluated on their own. Only after all of the pieces have been individually examined can the problem be properly approached as a whole.

So, each "subject angle" is one piece of the puzzle. That's not to say they aren't plenty challenging in their own right. In fact, they are wonderful exercises for math, or science, or social studies class, even if you never have a chance to get into the other subject points-of-view.

Now we're ready to begin. The page to the right outlines the "subject angles" that we've created for the Problem-Based Scenario in this book.



The “Subject Angles”:

In order to properly respond to the Main Problem, it is important to consider multiple points-of-view. Below are several angles from which to approach the problem.

The Math Angle:

Does the penny cost more than it's worth?

Students will review the cost of producing a penny and compare that with its monetary value, and determine whether it makes economic sense.

The Science Angle:

What materials and resources are used in the process of making the penny?

Students will review the science involved in the making of the penny, as well as the natural resources needed, and determine if that should be factored into the decision about whether to continue minting the coin.

The Social Studies Angle:

Does the penny serve an important economic purpose in our monetary system?

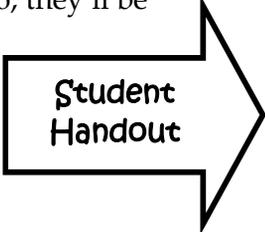
Students will review the economic role of the penny, and also how the public views the coin in general, and decide on the value of the coin from that perspective.

- ★ **Language Arts** serves as the hub for the entire exercise. It is in ELA that all of the other “subject angles” are evaluated and measured against one another, and a final decision about how to approach the Main Problem Scenario is made based on all of the available information.

Math Standards

As students work through this section of our Problem-Based Scenario, they'll be focusing on several key mathematical content areas. This includes:

- **Data Analysis**
- **The Number System**



Student
Handout

In addition – and perhaps more importantly – students will need to take on a mathematical frame of mind (in teacher parlance, this is referred to as the “Standards for Mathematical Practice”), which is key to benefit from Problem-Based Learning. This means that students will need to:

- **Make sense of problems and persevere in solving them.**
- **Reason abstractly and quantitatively.**
- **Construct viable arguments and critique the reasoning of others.**

You may want to share the goals listed above with your students prior to beginning the exercise, but the best part is that they'll be developing these skills whether they realize it or not!

The most important thing to remember when introducing the Problem-Based Scenario is to grab student interest right away. It is a fun and challenging exercise, and you certainly want students to approach it that way.

To make this easy for you, we have created a handout to introduce the “math angle” to your students for this Problem-Based Scenario. This will help them see that they will be looking at the Main Problem Scenario from a specific point-of-view, in this case with a mathematical focus.



**Make photocopies of the next page to
introduce the “Math Angle” of this
Problem-Scenario to your students**



What's the Problem?



Are you ready to tackle the problem?

The Scenario:

You are an economic advisor who has been asked to make a recommendation about the future of the penny. The one-cent coin is the smallest currency we have in circulation (and what you can buy with it goes down every year). It has been argued that it's time to get rid of the penny, while others feel that this choice would have a negative impact. What is the correct course of action?

In order to properly respond to a complicated problem like the one above, you must view it from multiple points of view. In this case, we will consider the following:

Something to think about:

Does the penny cost more than it's worth?

Prior to giving your response, you will review multiple resources, engage in classroom discussion, and take time to organize your thoughts.

In this exercise, you will review the true cost of producing a penny and compare that with its monetary value, and decide whether it makes economic sense.



*As you work on this exercise, remember that this is primarily a **mathematics question**. This means that numbers, statistics, and calculations will be needed to support your ideas!*

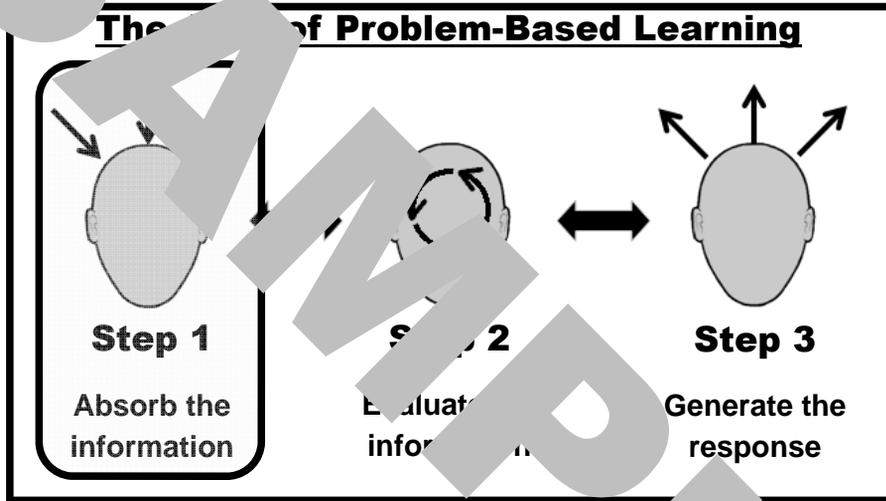
A large selection of pages has been chosen for you to review (full book = 88 pages).

Teacher Instruction Sheet

Problem-Based Scenario	
Section ① -	Stimulus Review
Section ② -	Classroom Discussion
Section ③ -	Student Response
Section ④ -	Grading & Analysis

Stimulus Review

The Stimulus Review is **Section 1** on your Teacher Instruction Sheet.



The MATH ANGLE

It's a fancy term, but the "Stimulus Review" is simply the first step in Problem-Based Learning where students review a variety of information surrounding the specific problem or challenge.

In our Problem Scenario, all of the Stimulus Items have been provided for you. We have intentionally gathered a variety of different types and sources. This is important in today's modern world where information comes from all directions and also sets the stage for Step 2 (Evaluating the Information).

A few examples of the types of Stimulus Items you might see in a Problem-Based Scenario include:

- **Articles**
- **Statistics**
- **Audio Recordings**
- **Videos**
- **Lists**
- **Cartoons**
- **Infographics**
- **Websites**
- **Primary Sources**
- **Blogs**
- **Editorials**
- **Advertisements**

...and much more!

For your convenience, we've placed all of the Stimulus Items for this Problem-Based Scenario on a special website where **both you and your students** can have full access to them. To access these resources, you will go to:



The screenshot shows a web browser window with the URL <http://www.oblproject.com/students>. The page has a header with the text "What's the Problem?" and a small cartoon character. Below the header is a login form with two input fields labeled "Login:" and "Password:", and a "Login" button.

The Stimulus Items you will see for this section of the exercise include:

Stimulus Item #1

— “What does a penny cost?” (video)

Stimulus Item #2

— “Value of a Penny” (statistics)

Stimulus Item #3

— “Making U.S. Currency” (infographic)

A Few Notes:

There are a few things we'd like to highlight as your students get ready to dive into the Stimulus Items. First, these are actual sources that have been gathered for the topic at hand, even if they have been edited or adapted at times due to length, format, or readability. That means that they don't necessarily reflect our personal opinions, and we certainly don't want to take credit for the hard work of others (all source information will be provided). It does, however, provide a nice mix for your students.

Next, the Stimulus Items should give your students the background information they need to generate their responses to the Problem-Based Scenario. There is no need for you to seek out other resources or for students to do their own research.

With that said, it is always great if there is an opportunity for students to get on a computer or head to the library to find their own background information. Being able to conduct your own research is a vital skill to have, and it is referenced throughout Language Arts standards.

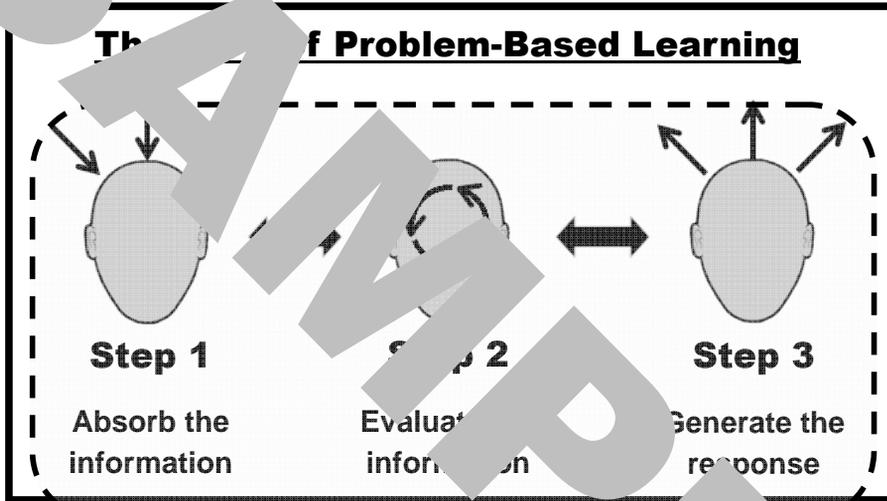
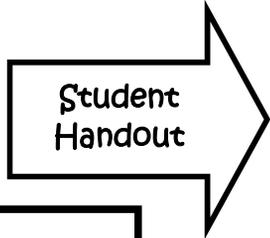
Again, this extra step is not necessary to successfully go through the exercise (we know you're already crunched for time!), but we figured it was worth mentioning!

Teacher Instruction Sheet

Problem-Based Scenario	
Section ① -	Stimulus Review
Section ② -	Classroom Discussion
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“Thought-Gathering” Sheet

The “Thought-Gathering” Sheet is an interim step prior to the student responses.



The MATH ANGLE

So, by this point, you’ve had students review Stimulus Items related to the Problem Scenario. That led to a stimulating (we hope) classroom discussion on the topic.

Often times, there is a feeling of “information overload” at this stage. Students have enough information to generate their constructed responses and/or make their product options (we’ll talk about these on the upcoming pages), but their thoughts may be all over the place. They may still have to pick their position, refine their arguments, focus their proposal, perfect their design... and so on.

That’s where the “Thought-Gathering” Sheet comes in. This isn’t to be confused with any “note-taking sheets” your students may have written while they were looking through the Stimulus Items or listening to the discussion. Rather, this is a final stage where they sort everything (including their own notes) to prepare for their response. It is a chance to tie together Step 1, Step 2, and Step 3 (shown above).

We have provided a “Thought-Gathering” sheet that works with this exercise and is a good chance for students to organize their ideas prior to creating their responses.





Penny Debate

"Thought-Gathering" Sheet



Way the "penny debate" involves math:

SAMPLE

Numbers, stats, & data that suggest we should <u>keep</u> the penny:	Numbers, stats, & data that suggest we should <u>get rid of</u> the penny:

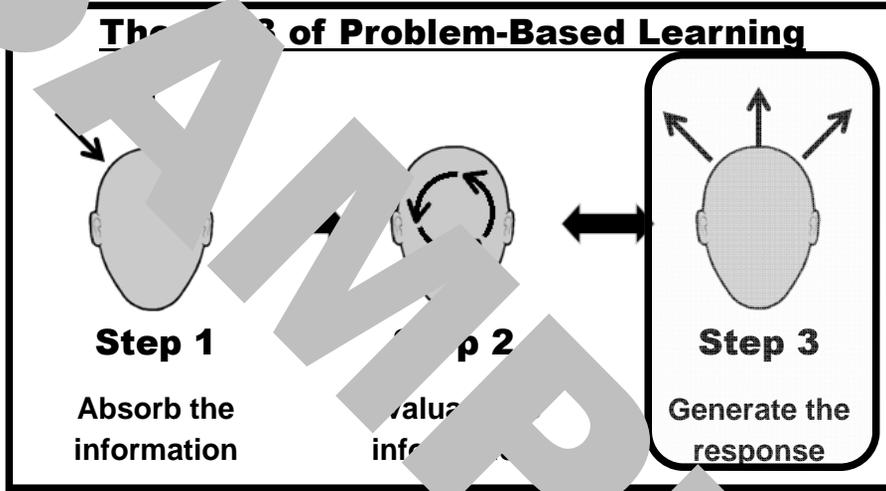
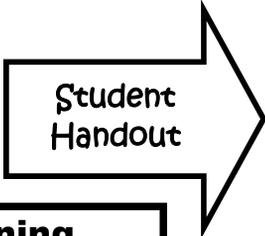
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Problem-Based Scenario	
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Section ④ -	Grading & Analysis

Student Responses (“Product Option”)

The Student Responses are **Section 3** on your Teacher Instruction Sheet.



The MATH ANGLE

It all leads up to this – “The Product Option.” It is here that students will have the “thinking muscle” truly stretched and those 21st Century Skills (collaboration, communication, technology, and so on) will be finely tuned.

Let’s start with a very simple definition:

The Product Option – where students are asked to “produce something”

Yes, this is very broad, and could include any of the following (and so much more):

Bulletin Board	Advertisement	Chart	Role Play	Tips / Suggestions
Letter	Cartoon	Pop-up / Child Book	Commercial	Slogan / Motto
Comic Strip	Play	Collage	Riddles / Jokes	Marketing Plan
Movie Trailer	Poster / Artwork	Timeline	Graphic Organizer	Jingle
Demonstration	Political Cartoon	Prototype	Brochure	Campaign Platform
Diary Entry	Costume	Crossword Puzzle	Poem	Experiment
Editorial Essay	Newspaper Article	Database / Spreadsheet	Rap Song	Mosaic
Map	Diorama	Oral Report	Webpage	Argument
Lesson Plan	Display	Rebus Story	Instruction Manual	Proposal
Fiction Story	Mock Interview	Slide Show	Petition	Illustrated Story
Interview	Survey	Recipe / Instructions	Game	Radio show

After you divide your students into teams, photocopy the next page to outline the Product Option for this scenario.



What's the
Problem?



The task at hand...

Working together to solve something as a team can help you gain a better understanding of the problem-scenario. Please work together on the exercise below.

Your group is serving as **economic advisors** to the United States government. You need to **prepare an oral and visual presentation** to a Senate Committee that is trying to decide whether or not to get rid of the one-cent penny. The committee has asked your team to answer one question: *“What is the true value of the penny compared to its true cost to mint?”*

Of course, it is your job to help the committee understand that calculating “true value” and “true cost” can be complicated when you consider factors such as fixed costs in the minting process (i.e. the cost to run and manage the minting factory regardless of which type of coins are being minted), the lifespan of the penny, and the amount of times it is used over that lifespan.

Based on the numbers and your best estimates, give your recommendation to the committee as to whether to include or remove the penny from our monetary system.

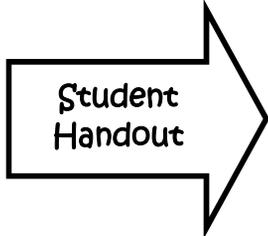
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Teacher Instruction Sheet

Problem-Based Scenario	
Section ①	Stimulus Review
Section ②	Classroom Discussion
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Section ④	Grading & Analysis

Grading Rubric (Product Option)

The Grading Rubric is **Section 3** on your Teacher Instruction Sheet.



The MATH ANGLE

We mention this time and time again throughout this book, and it's worth saying another time:

It's all about the process.

The purpose of these exercises is to encourage students to think through problems and situations, and it's the teacher's role to guide them through the journey.

Without a doubt, your students will remind you about the process when they try to convince you to be gentle during the grading process. After all, they've been brought up to bubble in the correct circle with a #2 pencil, so being asked to "produce" something from a variety of information can be tricky. But they'll do just fine.

As students work through the process, they will learn subject-specific skills and cover a few important standards. Yet they'll also be developing those 21st-century skills and lifelong traits that we mention throughout this book (a few are listed below).

- ◆ Critical Thinking
- ◆ Collaboration
- ◆ Entrepreneurialism
- ◆ Patience / Persistence
- ◆ Researching
- ◆ Leadership
- ◆ Self-Direction
- ◆ Listening
- ◆ Creativity
- ◆ Technological Ability
- ◆ Internet / Media Literacy
- ◆ Healthy Skepticism
- ◆ Planning
- ◆ Social Awareness
- ◆ Data Analysis
- ◆ Imagination
- ◆ Communication
- ◆ Scientific Literacy
- ◆ Personal Expression
- ◆ Flexibility / Adaptability

It's difficult to put a hard grade on any of those, and it isn't the final goal. If you live by the mantra, "It's all about the process," these skills will indeed be developed. With that said, you do want to provide worthwhile feedback to your students. We use a simple—but sound—rubric to help students "ace the **TEST**" (a clever acronym to help them remember the key steps). The rubric is provided to the right for your convenience.

Photocopy this scoring sheet for your students to review.





How do I get an A?

As you work in teams on this exercise, you will be evaluated to see if you ace the **TEST**:

- T**horoughness
- E**vidence
- S**trategy
- T**eamwork



Thoroughness

- _____ The group completed all of the required tasks (15 points)
- _____ Everyone followed the plan throughout the process (15 points)

Evidence

- _____ The group's final product was logical and clearly defended (15 points)
- _____ A variety of evidence was provided to support the product (10 points)

Strategy

- _____ The group kept its focus on the requirements of the product (15 points)
- _____ The group used a sound approach in completing the exercise (10 points)

Teamwork

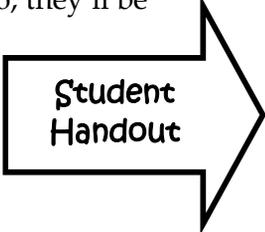
- _____ Everyone in the group participated and played a key role (10 points)
- _____ All members of the group worked well together (10 points)

Shown above are general areas that your teacher will be evaluating as he or she scores the products you create with your team. You may be provided more details about what it takes to receive the full value in any one of these areas.

Science Standards

As students work through this section of our Problem-Based Scenario, they'll be focusing on several science content areas. This includes:

- **Earth's Materials**
- **The Environment**



Student Handout

In addition – and perhaps more importantly – students will need to take on a scientific frame of mind (in academic circles, these are referred to as the “Science and Engineering Practices”), which is a key element of Problem-Based Learning. This means that students will be:

- **Asking questions and defining problems.**
- **Constructing explanations and designing solutions.**
- **Engaging in argument from evidence.**
- **Obtaining, evaluating, and communicating information.**

You may want to share the goals listed above with your students prior to beginning the exercise, but the best part is that they'll be developing these skills whether they realize it or not!

The most important thing to remember when introducing the Problem-Based Scenario is to grab student interest right away. It is a fun and challenging exercise, and you certainly want students to approach it that way.

To make this easy for you, we have created a handout to introduce the “science angle” to your students for this Problem-Based Scenario. This will help them see that they will be looking at the Main Problem Scenario from a specific point-of-view, in this case with a scientific focus.

Make photocopies of the next page to introduce the “Science Angle” of this Problem-Scenario to your students



Are you ready to tackle the problem?

The Scenario:

You are an economic advisor who has been asked to make a recommendation about the future of the penny. The one-cent coin is the smallest currency we have in circulation (and what you buy with it goes down every year). It has been argued this time to get rid of the penny, while others feel that such a choice would have a negative impact. What is the correct course of action?

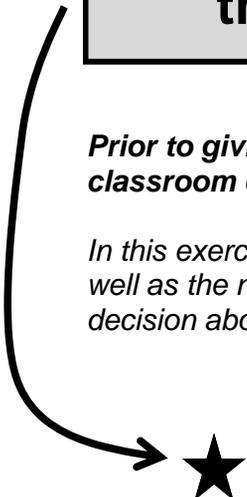
In order to properly respond to a complicated problem like the one above, you must view it from different points of view. In this case, we will consider the following:

Something to think about:

What materials and resources are used in the process of making the penny?

Prior to giving your response, you will review multiple resources, engage in classroom discussion, and take time to organize your thoughts.

In this exercise, you will review the science involved in the making of the penny, as well as the natural resources needed, and determine if that should be factored into the decision about whether to continue minting the coin.



★ *As you work on this exercise, remember that this is primarily a **science question**. This means that scientific facts will be needed to support your ideas, and you'll also want to maintain a healthy skepticism throughout the exercise!*

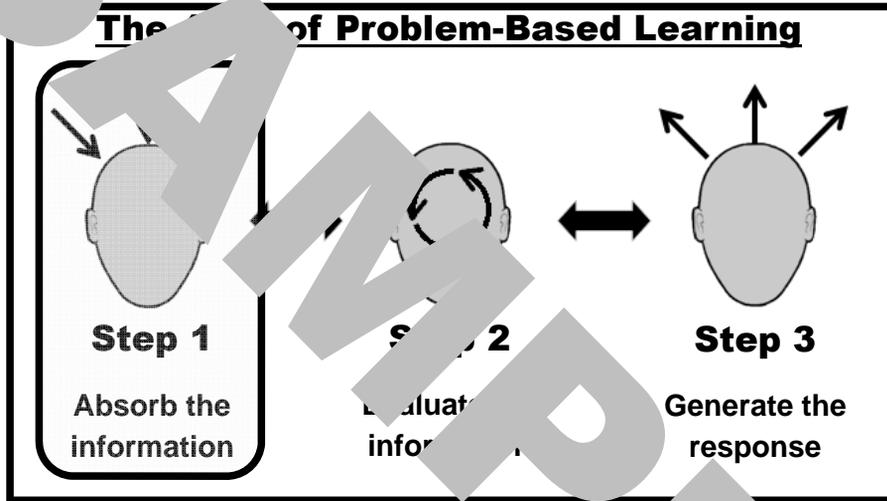
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Stimulus Review

The Stimulus Review is **Section 1** on your Teacher Instruction Sheet.



The SCIENCE ANGLE

It's a fancy term, but the "Stimulus Review" is simply the first step in Problem-Based Learning where students review a variety of information surrounding the specific problem or challenge.

In our Problem Scenario, all of the Stimulus Items have been provided for you. We have intentionally gathered a variety of different types and sources. This is important in today's modern world where information comes from all directions and also sets the stage for Step 2 (Evaluating the Information).

A few examples of the types of Stimulus Items you might see in a Problem-Based Scenario include:

- **Articles**
- **Videos**
- **Infographics**
- **Blogs**
- **Statistics**
- **Lists**
- **Websites**
- **Editorials**
- **Audio Recordings**
- **Cartoons**
- **Primary Sources**
- **Advertisements**

...and much more!

For your convenience, we've placed all of the Stimulus Items for this Problem-Based Scenario on a special website where **both you and your students** can have full access to them. To access these resources, you will go to:



<http://www.pblproject.com/students>

Login: _____
Password: _____
Login

The Stimulus Items you will see for this section of the exercise include:

Stimulus Item #1

— “Minting a coin is revealed” (list of steps)

Stimulus Item #2

— “Environmental Impact of the Penny” (article)

Stimulus Item #3

— “Making the Penny Better” (editorial)

A Few Notes:

There are a few things we'd like to highlight as your students get ready to dive into the Stimulus Items. First, these are actual sources that have been gathered for the topic at hand, even if they have been edited or adapted at times due to length, format, or readability. That means that they don't necessarily reflect our personal opinions, and we certainly don't want to take credit for the hard work of others (all source information will be provided). It does, however, provide a nice mix for your students.

Next, the Stimulus Items should give your students the background information they need to generate their responses to the Problem-Based Scenario. There is no need for you to seek out other resources or for students to do their own research.

With that said, it is always great if there is an opportunity for students to get on a computer or head to the library to find their own background information. Being able to conduct your own research is a vital skill to have, and it is referenced throughout Language Arts standards.

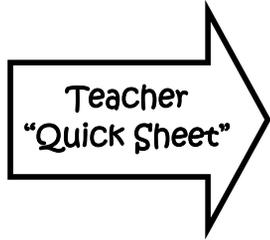
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Teacher Instruction Sheet

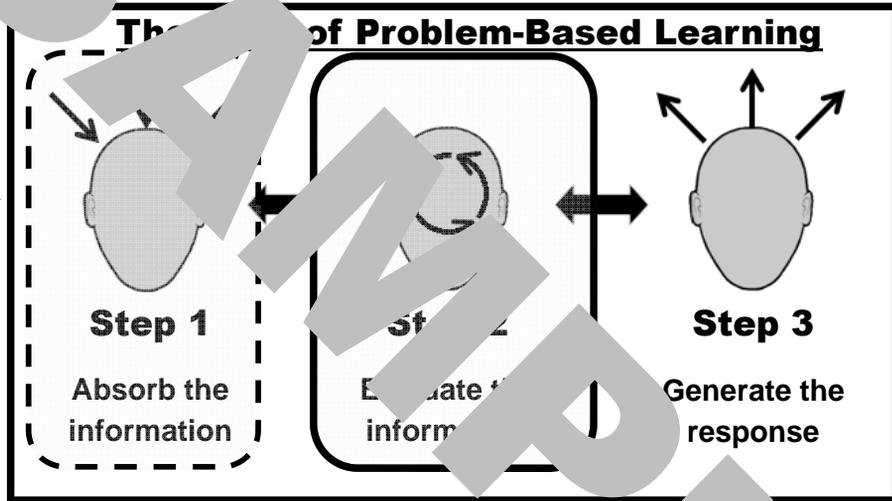
Problem-Based Scenario	
Section ① -	Stimulus Review
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Classroom Discussion

The Classroom Discussion is **Section 2** on your Teacher Instruction Sheet.



The SCIENCE ANGLE



Now that your students have reviewed the Stimulus Item, it is a fitting time to have a **class discussion** about the Problem-Based Scenario (specifically, the “science angle” that you’re working with).

At this stage, there will be a limited amount of new information brought to the table (Step 1), although you might want to introduce ideas not covered in the stimulus, and perhaps students will share original thoughts and experiences. For the most part, though, the classroom discussion is where you want students to evaluate the information (Step 2) to which they’ve been exposed. It is now that they will begin to organize it all and decide how it will fit together in their response.

The key to a classroom discussion, of course, is keeping everything focused and moving it in the direction you want, and at the same time creating a free environment for students to share and build on ideas. This is certainly where teachers earn their pay! One way we’ve tried to help (a little bit, at least) is to provide you with the talking points that work well for this scenario. The bold questions are what you will ask your students, and each has bullet points that you can use to guide the discussion.





Leading Questions for Classroom Discussion **The Penny Debate (science angle)**

How is a penny made?

- Consider raw materials used to make a penny, which is mostly zinc and a small percentage of copper (the penny used to be mostly copper)
- Consider the steps of making a penny, including the creation of the die (a template for the coin), rolling the sheets of the metal, and cutting the sheets with the die
- Consider that it takes tremendous amount of machinery and energy to mint several billion pennies each year

Is the minting of pennies bad for the environment?

- Consider that raw materials must be mined to mine the coin (the penny used to be mainly copper, which had a major environmental impact... now, it's mainly zinc, which still results in some environmental concerns)
- Consider the energy used and waste generated by factories creating billions of pennies each year
- Consider that there are billions of pennies in circulation, and many are thrown away or ignored

Are there ways to limit the environmental impact of minting the penny?

- Consider that the raw materials used to make the penny can always be changed (in 1982, the coin was switched from mostly copper to mostly zinc)
- Consider that we do not need to get rid of the penny to help the environment..., it might be worthwhile to simply mint less of them each year (there will still be billions already in circulation)
- Consider that machinery to mint coins should always be improved and updated because they are constantly in use, and environmental safety should be a major factor in these improvements

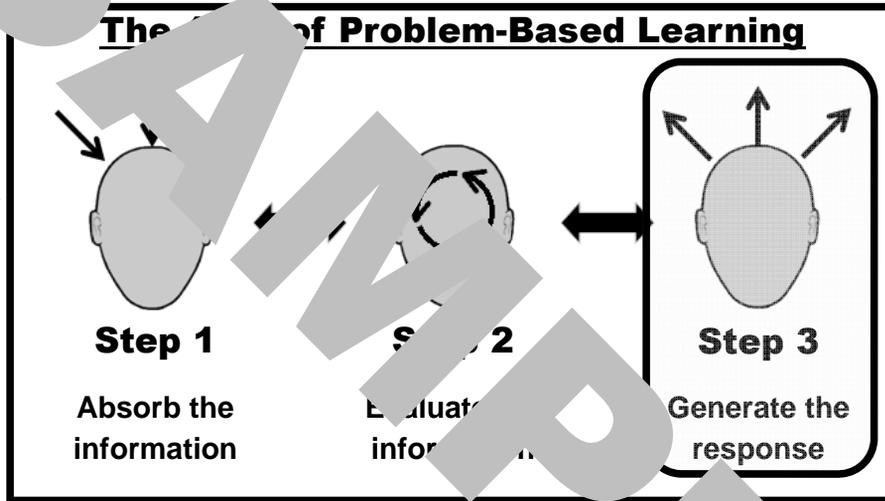
Teacher Instruction Sheet

Problem-Based Scenario	
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Section ④ -	Grading & Analysis

Student Responses (Extended Response)

The Student Responses are **Section 3** on your Teacher Instruction Sheet.

Student Handout



The SCIENCE ANGLE

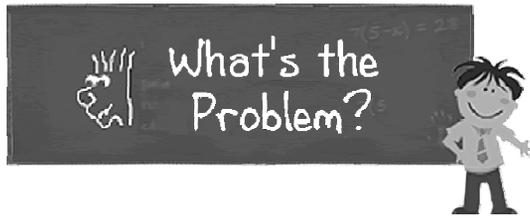
On your Teacher Instruction sheet, you'll see that each scenario provides two types of response options for your students—Extended Responses and the Product Option. Let's look at the "Extended Responses" first.

As you would expect, the Extended Responses are simply questions arising around the Problem-Based Scenario that the students answer through their writing.

Most likely, the Extended Responses are similar to what you might see in a Performance Task of a comprehensive assessment (where students are given a range of information to review, and then must give their conclusions based on the evidence). The "test prep" benefits alone make it worthwhile for students to complete the Extended Responses, but the broader benefit is their ability to take the information they've been exposed to and generate a logical response to a problem scenario.

The rubric and process for grading Extended Responses is on the following pages. Also, we will leave it up to you whether you want to allow students to use notes they have taken throughout (we think it's fine for them to do so), and also how strict you want to be with time limits (a half hour or so should be fine).

Here are the Extended Response questions for this scenario.



What do you think?

The questions below are centered around the Problem-Based Scenario you've been reviewing. Please answer the questions on separate sheets of paper.

- 1) What raw materials are used to currently make the penny, and how does the entire process have an impact on the environment?
- 2) Would removing pennies from our monetary system be good for the environment? Why or why not? Can changes be made to reduce any negative impact?



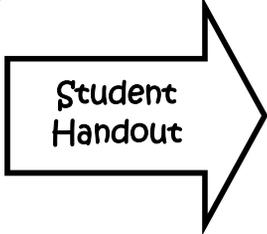
Remember to support your answers with evidence that you've gathered from what you've read and discussed in class!

Teacher Instruction Sheet

Problem-Based Scenario	
Section ① -	Stimulus Review
Section ② -	Classroom Discussion
Section ③ -	Student Response
Section ④ -	Grading & Analysis

Grading Rubric (Extended Responses)

The Grading Rubric is **Section 3** on your
Teacher Instruction Sheet.



Student
Handout

One thing that your students need to understand about these Problem-Based Scenarios is that the answer is never “yes” or “no.” Instead, students must think their way through the muddy waters of different situations and challenges, while you guide them along the journey.

Of course, the end result needs to be more than just a “right” or “wrong” answer—back—and that’s why proper grading is so important. While students may think that grades exist only to cause stress and fill the blank spaces on a report card, the broader goal is that when students are graded in a clear and fair way, it enables them to gradually improve their approach and response.

The Extended Responses for this scenario can be graded using the rubric to the right. It is divided into four sections:

- 1) Science Content** (What do you want students to bring to the table based on previous lessons?)
- 2) Writing Focus** (Was it clear what point the students were trying to make?)
- 3) Use of Evidence** (Did the students back up their position with evidence, quotes, statistics, and facts?)
- 4) Language & Conventions** (Did students limit mistakes and respond in a thorough and professional manner?)

Here is a copy of the rubric for your students to review.



What's the Problem?



How do I get an A?

Listed below are the four different areas that will be evaluated as your responses are graded. Be sure to consider each area as you write.

Rubric Section #1: **Science Content** – you must show a high level of background knowledge and general understanding of the topic

****in other words:** *What are you bringing to the table based on previous lessons?*

4	3	2	1	NS
You provided a high level of background knowledge of the subject.	You showed background knowledge with most of your response.	You showed a limited level of background knowledge, and only in certain parts of your response.	You showed barely any background knowledge of the subject throughout your response.	Your response was incoherent, off-topic, or unable to be read.

Rubric Section #2: **Purpose & Organization of Writing** – you must organize and sustain your writing based on a defined purpose

****in other words:** *Was it clear what you were trying to make, and did you focus on that point?*

4	3	2	1	NS
Your response had a defined purpose, and it was organized with a clear focus on that purpose.	Your response had a defined purpose, although it lacked organization and a clear focus on that purpose.	The purpose of your response was vague, and there was limited organization and focus.	There was no defined purpose or organization for your response.	Your response was incoherent, off-topic, or unable to be read.

Rubric Section #3: **Integration of Knowledge & Ideas (use of “evidence”)** – you must support your arguments and positions with outside information (“stimulus items”)

****in other words:** *Did you back up your position with evidence, quotes, statistics, and facts?*

4	3	2	1	NS
You provided convincing support/evidence for your main idea and included appropriate sources, facts, & details.	You provided adequate support/evidence for your main idea and only limited sources, facts, & details.	You provided only modest support/evidence for your main idea and it was not strengthened by sources, facts, & details.	You provided almost no support/evidence to your main idea.	Your response was incoherent, off-topic, or unable to be read.

Rubric Section #4: **Language & Conventions** – you must use proper grammar, spelling, vocabulary, and other conventions of the English language

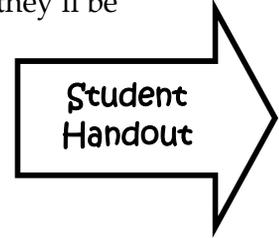
****in other words:** *Did you limit mistakes and respond in a thorough and professional manner?*

4	3	2	1	NS
Your response was professional and you demonstrated a command of language	Your response was mostly professional with limited errors related to language conventions.	Your response was rather sloppy with multiple errors related to language	Your response was completely sloppy and showed no effort to follow language	Your response was incoherent, off-topic, or unable to be read.

Social Studies Standards

As students work through this section of our Problem-Based Scenario, they'll be focusing on several social studies content areas. This includes:

- **Economics (our money)**
- **Politics & Public C**



In addition – and perhaps more important – students will need to understand basic principles of social studies, which is the benefit of Problem-Based Learning. This means that in addition to the basic social studies standards, students will become familiar with the broader themes of social studies. For example:

- **Culture and Cultural Diversity**
- **Time, Continuity, and Change**
- **People, Places, and Environments**
- **Individual Development and Identity**
- **Individuals, Groups, and Institutions**
- **Power, Authority, and Governance**
- **Production, Distribution, and Consumption ***
- **Science, Technology, and Society ***
- **Global Connections**
- **Civic Ideals and Practices**

**an asterisk has been placed beside each theme that is a major part of this PBL exercise*

You may want to share the themes listed above with your students prior to beginning the exercise, but the best part is that they'll be developing a broad understanding whether they realize it or not!

The most important thing to remember when introducing the Problem-Based Scenario is to grab student interest right away. It is a fun and challenging exercise and you certainly want students to approach it that way.

To make this easy for you, we have created a handout to introduce the “social studies angle” to your students for this Problem-Based Scenario. This will help them see that they will be looking at the Main Problem Scenario from a specific point-of-view, in this case with a focus on society and historical trends.

The SOCIAL STUDIES ANGLE

Make photocopies of the next page to introduce the “Social Studies Angle” of this Problem-Scenario to your students



What's the Problem?



Are you ready to tackle the problem?

The Scenario:

You are an economic advisor who has been asked to make a recommendation about the future of the penny. The penny is the smallest currency we have in circulation (and what you can buy with it goes down to a penny). It has been argued that it's time to get rid of the penny, but others feel that choice would have a negative impact. What is the correct course of action?

In order to properly respond to a complicated problem like the one above, you must view it from different perspectives. For example, we will consider the following:

Something to think about:

Does the penny serve an important economic purpose in our monetary system?

Prior to giving your response, you will review multiple resources, engage in classroom discussion, and take time to organize your thoughts.

In this exercise, you will review the economic role of the penny, and also how the public views the coin in general, and decide on the value of the coin from that perspective.



*As you work on this exercise, remember that this is primarily a **social studies question**. This means that you must consider historical and current trends in our society, along with other political and economic factors, when providing your response.*

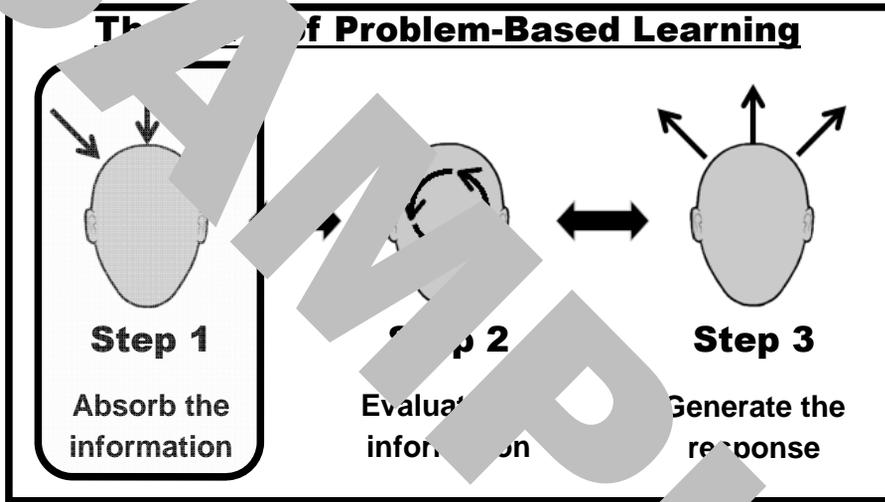
Teacher Instruction Sheet

Problem-Based Scenario	
Section ① -	Stimulus Review
Section ② -	Classroom Discussion
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Stimulus Review

The Stimulus Review is **Section 1** on your Teacher Instruction Sheet.

The SOCIAL STUDIES ANGLE



It's a fancy term, but the "Stimulus Review" is simply the first step in Problem-Based Learning where students review a variety of information surrounding the specific problem or challenge.

In our Problem Scenario, all of the Stimulus Items have been provided for you. We have intentionally gathered a variety of different types and sources. This is important in today's modern world where information comes from all directions, and also sets the stage for Step 2 (Evaluating the Information).

A few examples of the types of Stimulus Items you might see in a Problem-Based Scenario include:

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...and much more!

For your convenience, we've placed all of the Stimulus Items for this Problem-Based Scenario on a special website where **both you and your students** can have full access to them. To access these resources, you will go to:



The Stimulus Items you will see for this section of the exercise include:

Stimulus Item #1

— "Public Sentiment on the Penny" (video)

Stimulus Item #2

— "A Penny's Place in Our Economy" (article)

Stimulus Item #3

— "Keep the Penny or Retire It?" (online forum)

A Few Notes:

There are a few things we'd like to highlight as your students get ready to dive into the Stimulus Items. First, these are actual sources that have been gathered for the topic at hand, even if they have been edited or adapted at times due to length, format, or readability. That means that they don't necessarily reflect our personal opinions, and we certainly don't want to take credit for the hard work of others (all source information will be provided). It does, however, provide a nice mix for your students.

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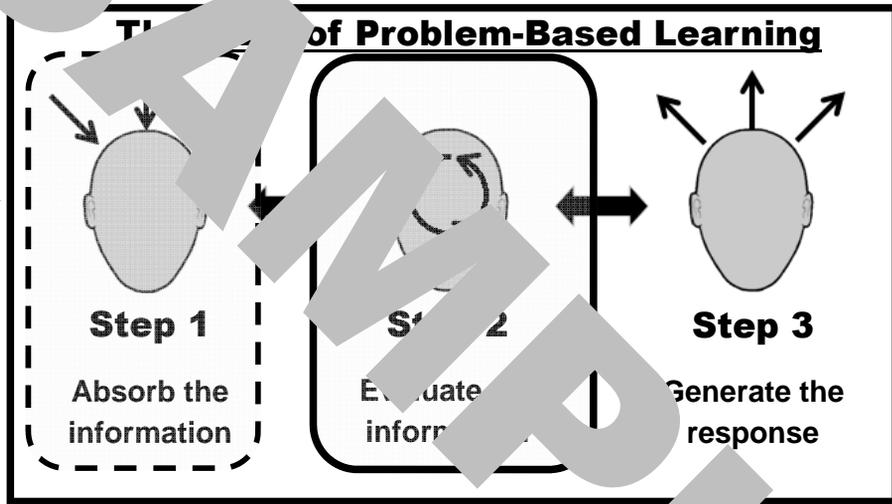
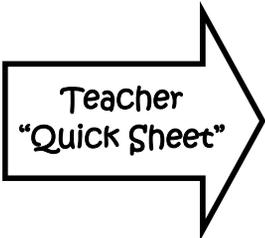
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Teacher Instruction Sheet

Classroom Discussion

Problem-Based Scenario	
Section ① -	Stimulus Review
Section ② -	Classroom Discussion
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The Classroom Discussion is **Section 2** on your Teacher Instruction Sheet.



The SOCIAL STUDIES ANGLE

Now that your students have reviewed the Stimulus Item, it is a fitting time to have a **class discussion** about the Problem-Based Scenario (specifically, the “angle” that you’re working with).

At this stage, there will be a limited amount of new information brought to the table (Step 1), although you might want to introduce ideas not covered in the stimulus, and perhaps students will share original thoughts and experiences. For the most part, though, the classroom discussion is where you want students to evaluate the information (Step 2) to which they’ve been exposed. It is now that they will begin to organize it all and decide how it will fit together in their response.

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Leading Questions for Classroom Discussion

The Penny Debate (social studies angle)

What role does the penny play in our economic system?

- Consider that the face value of the penny is 1 cent, which is based on its purchasing power (the amount that can be purchased with 1 cent actually goes down over time)
- Consider that the penny is used as a marketing tool, with businesses often subtracting a penny from a price (for example, \$1.99 instead of \$2.00)...getting rid of the penny means that a lot of prices will be rounded up to a slight degree
- Consider how pennies add to inflation over time, and they are actually a major source of income for charities and small businesses
- Consider the amount of time the general population wastes looking for a penny at a register to pay, thus holding up the line and wasting everyone else's time

What would be the public reaction if it was announced that the penny was going to be removed from circulation?

- Consider the sentimental value of the "Lincoln Penny" and how people may feel to hear it will soon be gone
- Consider how many people might have greater issues to worry about than whether or not the penny exists
- Consider the major economic issues of the time, and whether or not most people feel that the "penny debate" should be among them

In the end, is it really worth it to get rid of the penny?

- Consider that when all variables are considered, it is very difficult to see if the penny costs more to mint than it's value (especially when you consider that a single penny stays in circulation for more than 30 years and is used multiple times)
- Consider the logistical effort to remove the coin from circulation (billions of pennies are already out there, and would have to be removed by banks and other sources)
- Consider that even if most people are okay with removing the penny, there are some who would support the coin and would voice those opinions strongly (and loudly)
- Consider that there is currently no major public support to get rid of the penny (according to major polls), even if people believe there are cost benefits... on the other hand, that means that people probably wouldn't care much if it was removed

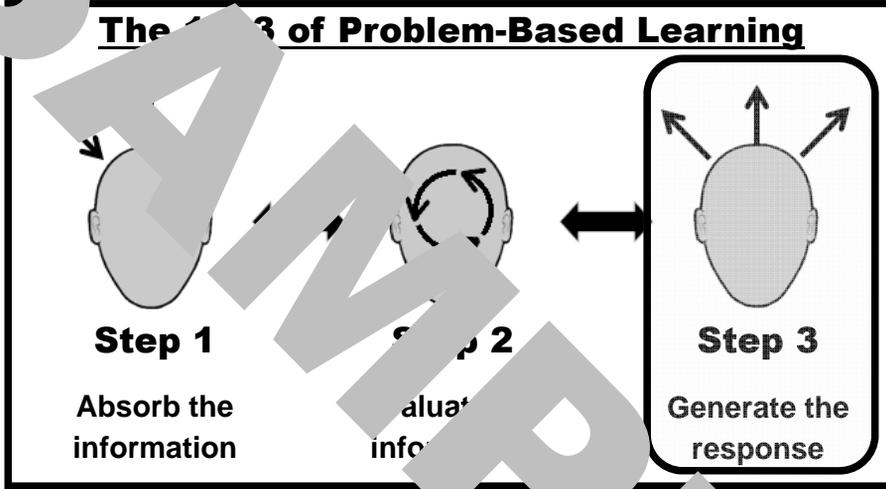
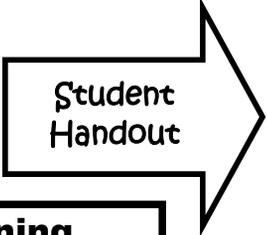
A large selection of pages has been chosen for you to review (full book = 88 pages).

Teacher Instruction Sheet

Problem-Based Scenario	
Section ① -	Stimulus Review
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Section ③ -	Student Responses
Section ④ -	Grading & Analysis

Student Responses (“Product Option”)

The Student Responses are **Section 3** on your Teacher Instruction Sheet.



The SOCIAL STUDIES ANGLE

It all leads up to this – “*The Product Option.*” It is here that students will have the “thinking muscle” truly stretched and those 21st Century Skills (collaboration, communication, technology, and so on) will be finely tuned.

Let’s start with a very simple definition:

The Product Option – where students are asked to “produce something

Yes, this is very broad, and could include any of the following (and so much more):

Bulletin Board	Advertisement	Chart	Role Play	Tips / Suggestions
Letter	Cartoon	Pop-up / Child Book	Commercial	Slogan / Motto
Comic Strip	Play	Collage	Riddles / Jokes	Marketing Plan
Movie Trailer	Poster / Artwork	Timeline	Graphic Organizer	Jingle
Demonstration	Political Cartoon	Prototype	Brochure	Campaign Platform
Diary Entry	Costume	Crossword Puzzle	Poem	Experiment
Editorial Essay	Newspaper Article	Database / Spreadsheet	Rap Song	Mosaic
Map	Diorama	Oral Report	Webpage	Argument
Lesson Plan	Display	Rebus Story	Instruction Manual	Proposal
Fiction Story	Mock Interview	Slide Show	Petition	Illustrated Story
Interview	Survey	Recipe / Instructions	Game	Radio show

After you divide your students into teams, photocopy the next page to outline the Product Option for this scenario.



What's the
Problem?



The task at hand...

Working together to solve something as a team can help you gain a better understanding of the problem-scenario. Please work together on the exercise below.

Your class is a **Research Team** that has been hired by the federal government. You have been given the task of **creating a survey** to determine how people factor pennies into their spending habits, and how people feel about pennies in general.

Your team must make a list of questions that will provide insight into how people use and feel about the penny. As a class, you will review the different survey questions created by each team, and discuss why those questions were chosen. The class will then create a "Master List" of the best questions.

If the survey was given to a large random sample of the American public, how do you think they would answer? Would an analysis of the survey results be useful when deciding whether to keep or get rid of the penny?

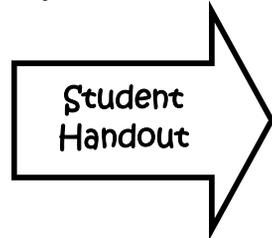
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Teacher Instruction Sheet

Problem-Based Scenario	
Section ① -	Stimulus Review
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Grading Rubric (Product Option)

The Grading Rubric is **Section 3** on your Teacher Instruction Sheet.



The SOCIAL STUDIES ANGLE

We mention this time and time again throughout this book, and it's worth saying another time:

It's all about the process.

The purpose of these exercises is to allow students to think through problems and situations, and it's the teacher's role to guide them through the journey.

Without a doubt, your students will remind you that "it's all about the process" when they try to convince you to be gentle during the grading process. After all, they've been brought up to bubble in the correct circle with a #2 pencil, so they're asked to "produce" something from a variety of information can be tricky, but they'll do just fine.

As students work through the process, they will learn subject-specific skills and cover a few important standards. Yet they'll also be developing those 21st-century skills and lifelong traits that we mention throughout this book (a few are listed below).

- ◆ Critical Thinking
- ◆ Collaboration
- ◆ Entrepreneurialism
- ◆ Patience / Persistence
- ◆ Researching
- ◆ Leadership
- ◆ Self-Direction
- ◆ Listening
- ◆ Creativity
- ◆ Technological Ability
- ◆ Internet / Media Literacy
- ◆ Healthy Skepticism
- ◆ Planning
- ◆ Social Awareness
- ◆ Data Analysis
- ◆ Imagination
- ◆ Communication
- ◆ Scientific Literacy
- ◆ Personal Expression
- ◆ Flexibility / Adaptability

It's difficult to put a hard grade on any of those, and it isn't the final goal. If you live by the mantra, "It's all about the process," these skills will indeed be developed. With that said, you do want to provide worthwhile feedback to your students. We use a simple – but sound – rubric to help students "ace the **TEST**" (a clever acronym to help them remember the key steps). The rubric is provided to the right for your convenience.

Photocopy this scoring sheet for your students to review.





How do I get an A?

As you work in teams on this exercise, you will be evaluated to see if you ace the **TEST**:

- T**horoughness
- E**vidence
- S**trategy
- T**eamwork



Thoroughness

- _____ The group completed all of the required tasks (15 points)
- _____ Everyone followed the instructions throughout the process (15 points)

Evidence

- _____ The group's final product was logical and could be defended (15 points)
- _____ A variety of evidence was provided to support the product (10 points)

Strategy

- _____ The group kept its focus on the requirements of the product (15 points)
- _____ The group used a sound approach in completing the exercise (10 points)

Teamwork

- _____ Everyone in the group participated and played a key role (10 points)
- _____ All members of the group worked well together (10 points)

Shown above are general areas that your teacher will be evaluating as he or she scores the products you create with your team. You may be provided more details about what it takes to receive the full value in any one of these areas.

A large selection of pages has been chosen for you to review (full book = 88 pages).

Student Responses

Language Arts

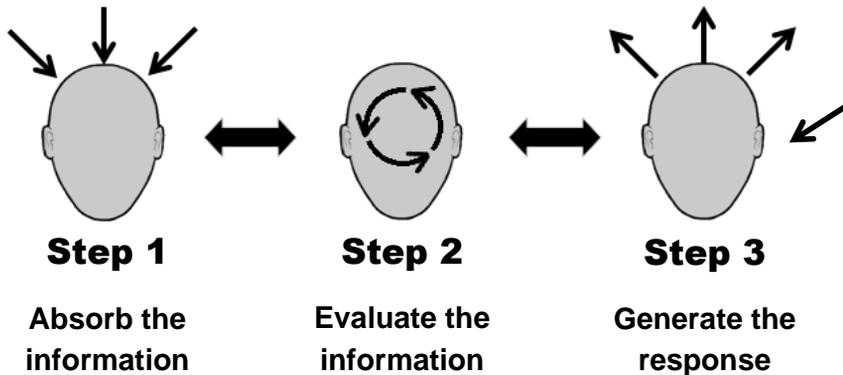
In previous editions of this book, students have only concentrated on one piece of the puzzle. Now we will look at the Main Problem Scenario as a whole, incorporating everything that has been researched and discussed along the way.

To respond to the Main Problem Scenario a prompt has been provided (shown to the right). Your students' work—perhaps oral presentations—will need to meet several expectations from a Language Arts objective. Students must:

- Show the ability to comprehend informative texts and resources
- Explain their position and overview
- Support their positions with evidence from research
- Articulate clear opinions (*stressed at the elementary level*)
- Form compelling arguments (*stressed at the middle school level*)
- Demonstrate speaking and listening skills

The skills above will only be demonstrated if students are able to absorb the Stimulus Items, organize their thoughts, and approach the Problem Scenario in a logical way. If they fail in these tasks before a single word is written on paper, they will never be able “write their way out of it” at this stage of the game. To put it another way:

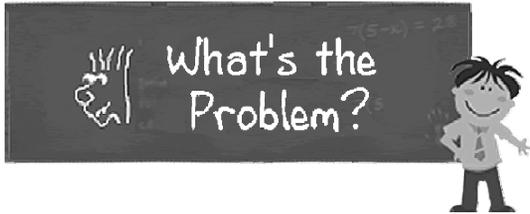
The 1-2-3 of Problem-Based Learning



This is not merely a writing exercise! Student responses will never satisfy all of the requirements listed above if Steps 1 and Steps 2 are incomplete.

The LANGUAGE ARTS ANGLE

Here is the Language Arts prompt for this Problem Scenario.



What do you think?

The prompt now is centered around the Problem Scenario you've been reviewing. Please provide your response on a separate sheet of paper.

A State Senator has asked for your opinion on the "Penny Debate," which is an argument over whether to keep the coin or get rid of it.

Write a recommendation to the Senator either in favor of keeping the penny, or discontinuing its use. You must explain the reasons for your viewpoint, and support it with evidence and sound reasoning.

A large selection of pages has been chosen for you to review (full book = 88 pages).

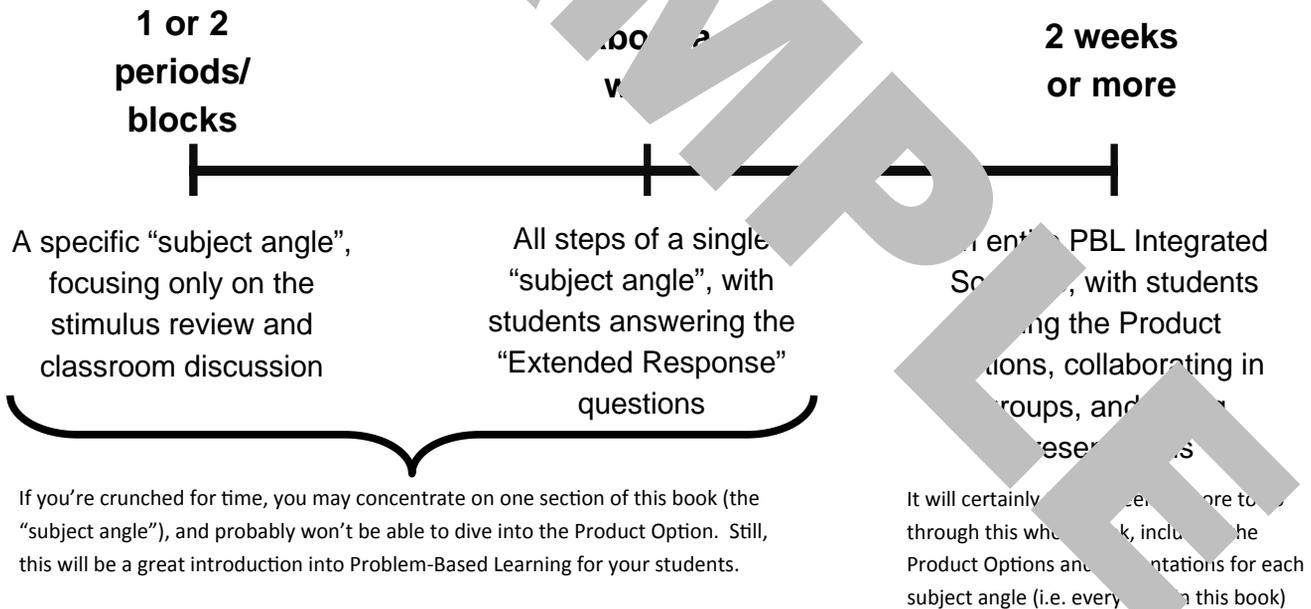
How long will it take?

Student Handout

Without a doubt, the most common question we are asked is:

“How long is this going to take?”

Our answer is, *it's up to you* (which could be seen as dodging the question). The truth is that it's all about your options and flexibility. Obviously, the time will greatly vary if you just do a “subject angle” problem (i.e. one section of this book) or do the entire integrated Problem Scenario (i.e. the whole book). Consider these guidelines:



In the end, if you can take a Problem Scenario all of the way from beginning to end, including each “subject angle”, as well as the products, group work, and presentations that go with each one, your students will have accomplished quite a bit. For that reason, we have included a **“Certificate of Accomplishment”** that you may want to provide to show students that their efforts are appreciated. Remember, you want them to enjoy the whole experience!

Photocopy this certificate to give to your students.

Certificate

of

A CHIEVEMENT

Awarded to

for completion of the following:

Problem-Based Scenario: “The Penny Debate”

By completing this entire scenario, you have demonstrated that you have the ability to approach a real-world problem about _____ in a variety of different sources, evaluate all of the information and present a clear and logical response to the challenge.

Given this date _____ *in the year* _____

Signed _____

