Integrated Problem Scenarios
Middle School / Secondary

The Scenario:

“The Football Program”

You are a school board member in a district that is considering the option of eliminating high school football. What is the correct course of action?

* 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 a school board member in a district that is considering the option of eliminating high school football. What is the correct course of action?

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

The Math Angle
Is football “worth it,” or does it cost too much money and time?

The Science Angle
Is football too dangerous of a sport?

The Social Studies Angle
How valuable are football traditions and the lessons taught by the team sport?

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.

www.pblproject.com

Homecourt Publishers
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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Why Problem-Based Learning?

The only clear and rational answer to, “Why Problem-Based Based Learning?” is to say that “Students need it.” Simply memorizing facts, definitions, or mathematical formulas does not equip a student to thrive in today’s world. This shift is highlighted by a few recent developments.

First, new academic standards (including the Common Core) that are being developed around the country are often centered around a simple mantra:

“College and Career Ready”

It seems obvious, but there’s a trick. “College and Career Ready” is a moving target. Consider a student who is in upper elementary school right now (ages 8 to 10). There is no telling what career he or she will have twenty years from now, at around the age of 30. There is a long list of jobs that didn’t exist even 10 years ago (app designer, social media manager, or Zumba teacher… just to name a few). There are certainly many career paths that don’t exist now, but will be common in a couple of decades (perhaps a virtual reality tour guide, body part replacement specialist, or weather modifier). Likewise, there are jobs that are familiar at the moment that may be on their way out (such as retail cashiers).

To try and predict the specific knowledge base and skills that a student will need for their future careers may be like an old-timer placing his music CDs into a time capsule just so he can have a good laugh twenty years later. To really drive home the point, consider a “predictable” job that has existed for hundreds of years, and will certainly exist for hundreds more. I’m referring to the trustworthy accountant (and for this exercise, we’ll just look at the “tax preparation” part of the accountant’s job, because taxes aren’t going anywhere!). Let’s see how this job has changed:

The Evolution of an Accountant (during tax season)

<table>
<thead>
<tr>
<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
<th>2000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armed with only a calculator and a huge reference book of tax laws, the accountant manually fills out spreadsheets and tax forms, closely checking all the math</td>
<td>Personal computers and digital spreadsheets arrive on the scene (i.e. early versions of Excel), greatly reducing the amount of time the accountant spends on calculations (while improving accuracy)</td>
<td>Accounting software (like Quick Books and Turbo Tax) keeps up with the intricate tax laws and also completes the math as you go. Computer skills suddenly become an accountant’s most important asset</td>
<td>Tax software is so user-friendly that people feel they can be their own “accountants”. Paid accountants (i.e. the real ones) become guides and “mistake-catchers”, and must be experts on the latest computer software</td>
</tr>
</tbody>
</table>

So, the skill set has changed and the accountant has gone from a quiet, detail-obsessed math guru to a software expert who is willing to empower the customers to do a job that once only he or she could do. And every job is going through similar transitions. One of the main reasons for this development is technology, which brings us to the question raised on the next page.
And what about technology?

Here’s something to think about: What do you teach a student who has access to all the information in the world?

It’s a fair question. You’d be hard-pressed to find a fact, statistic, quotation, formula, or tiny detail that an average 5th grader can’t find in less than a minute with a Smart Phone (or, coming soon, wearable technology). If they are armed with the right technology, students will react like so:

- “Who wrote Uncle Tom’s Cabin?” - “No problem.”
- “What is the formula to find the volume of a rectangular prism?” - “Piece of cake.”
- “What is the diet of the duck-billed platypus?” - “Coming right up.”

Consider this visual:

Technology is a game changer. The above illustration shows a trend that has been true for quite some time, and the age of “instant information” only makes life’s “Memorization” square smaller.

Yes, there is baseline knowledge every student should know, for example: Should elementary school students be able to name the first president of the United States? Of course. Should middle school students be able to graph a simple formula? Absolutely.

The issue is that the amount of information that is labeled “absolutely must memorize” keeps shrinking and, frankly, gets less critical to a student’s success. For example: Should students instantly know the capital of Alabama? It’s hard to say. After all, it’s only a click away.

We hate to be repetitive (not really), but it all comes back to the skills of Problem-Based Learning. These skills will be vital to students regardless of the inevitable changes that the future brings.

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

1. Absorb the information
2. Evaluate the information
3. Generate the response

The age of “instant information” may create a shift in classroom instruction, but it should be embraced by teachers and students. What is important to remember is that absorbing the information (Step 1) is just a small part of the process. In fact, technology can also be used to approach the other steps in unique ways (especially the way the student can respond in Step 3).
The Main Problem:

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

You are a member of the school board in a district that is considering the option of eliminating high school football throughout the district. What reasons might be given on both sides of the issue to continue or eliminate the football program? 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 book, 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 a single 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 into 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:**

Is football worth it, or does it cost too much money and time?

*Students will review logistical factors of the football program, such as the cost and revenue, time factors, and student participation. They will then decide if the sport is a boost or a drag on the district.*

**The Science Angle:**

Is football too dangerous of a sport?

*Students will review the safety issues dealing with football, compare it with other sports, and then decide if football is safe or too dangerous to be played by high school students.*

**The Social Studies Angle:**

How valuable are football traditions and the lessons taught by the team sport?

*Students will review social elements of football, such as the lessons learned on the field and the longstanding traditions that are created. They will then determine the value of these abstract benefits.*

★ **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.
A Note to Parents

Of course parents like to be kept in the loop, so they will appreciate a note home to tell them about the Problem-Based Learning and the specific scenario you will be working on with your students. But there’s another reason (perhaps a bit more sneaky) why we like to send the letter home. It helps set a tone for the entire exercise, prompting students to approach it with respect and a level of seriousness. It’s safer to say that when you send the “letter home”, you mean business.

We’ve written a sample letter below that can be a model for your Parent Letter. Obviously, you can add your own spin on it as you wish:

Dear Parents,

Our class is preparing to engage in a Problem-Based Learning exercise. The term “Problem-Based Learning” (or PBL) is being used more frequently in education, and I just want to take a moment to explain what we will be doing and what the goals are.

First, it’s an important part of an educator’s job to make sure students leave the classroom ready for the challenges of life and equipped with 21st century skills (i.e. skills that focus on communication, organization, technology, and problem-solving). We use these skills every day, whether they are obvious or not, so we often overlook as students absorb names and dates, facts and figures.

For example, let’s say you have to go to the bank in the afternoon. School may have a lesson on map reading and ask the students to find the best route to the bank. This provides an incomplete look at the challenge of actually going to the bank. In real life, getting directions to the bank is the easy part. To make it a successful outing, you will also ask yourself:

- What time do I need to go? What are the banking hours? What will traffic be like?
- Why am I going? What do I need to bring? Is this a drive-through visit or do I need to go inside?
- What else do I need to do this afternoon? How will my bank visit work into my overall schedule?

And so on… The ability to answer (and know enough to ask) these questions and respond accordingly enables you to use your time and resources in the best way (even with something as simple as going to the bank). Students need to learn to do the same. Allowing students to work through Problem-Based Learning scenarios will help them develop the skills that go beyond simple memorization.

For our problem-based scenario, we are going to fast-forward to the day when the students are working citizens, and they will have to address a real problem that has no easy answer. Here’s the specific task:

You are a member of the school board in a district that is considering the option of eliminating high school football throughout the district. What reasons might be given on both sides of the issue to continue or eliminate the football program? What is the correct course of action?

Obviously, this is not a “yes or no” problem. To come up with a logical approach, students will review different “stimulus items” related to the topic (articles, videos, statistics, infographics, etc.), engage in classroom discussion, and organize their thoughts as they absorb information. They will look at the problem scenario from several points-of-view across multiple subject areas. Next, they will work in groups to come up with the best approach or method, and they will present their findings in a simulated “real-life” situation. It will be challenging, but very enjoyable and it will ultimately result in a tremendous sense of accomplishment. Best of all, this exercise will help develop a wide variety of skills that students will use the rest of their lives!

Your Friendly Teacher
The Intro to Students

This is the fun part! The success of this exercise greatly depends on the excitement and engagement of the students. As you know, it’s best if you can hook them right from the start. We took this into consideration when creating this Problem-Based Scenario, and these are points that might be worthwhile to stress when introducing the Main Problem:

1. **First Person** — your students are main players in the problem... they are not solving an abstract problem for someone else
2. **Real-World** — the problem scenario is a real-life situation... this makes it more relevant and increases engagement
3. **Sense of Urgency** — simple phrases like “you must” and “it is important to” help add a sense of urgency
4. **Short and Sweet** — limit the introduction of the problem scenario to a few sentences... the details will be ironed out later

The Main Problem

1. The students are participants in the problem, so they will be approaching it from a first-person perspective.

   You are a member of the school board in a district that is considering the option of eliminating high school football throughout the district. What reasons might be given on both sides of the issue to continue or eliminate the football program? What is the correct course of action?

   By definition, a problem should have a sense of urgency (otherwise, it’s not a problem at all). The wording of the Main Problem was chosen to stress that it is something that must be addressed. Students will become more engaged if they, too, feel the pressure of the situation.

2. This scenario is a very real-world situation that is discussed by school districts around the country. Students can see that it may have an impact on their daily lives, and that will help their engagement.

3. As students work through the problem, they will be exposed to many details and related resources. For the introduction, though, it’s best to keep it “short and sweet” as shown above. This not only grabs students’ attention, but it actually makes it easier to understand the final goal of the problem scenario.
Math Standards

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

- Measurement (time and money)
- Data Analysis
- The Number System

In addition—and perhaps more importantly—students will need to take on a mathematical frame of mind (in academic circles, this is referred to as the “Standards for Mathematical Practice”), which is a key benefit of 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.
The Scenario:

You are a member of the school board in a district that is considering the option of eliminating high school football throughout the district. What reasons might be given on both sides of the debate to continue or eliminate the football program, and 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:

Is football “worth it,” or does it cost too much money and time?

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 logistical factors of the football program, such as the cost and revenue, time factors, and student participation. You will then decide if the sport is a boost or a drag on the district.

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!
Stimulus Review

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

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: football
Password: bg48

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

Stimulus Item #1
— “A Football Program (profit / loss sheet)

Stimulus Item #2
— “Football makes money… but not enough” (article)

Stimulus Item #3
— “Do athletes have enough time?” (visual)

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!
“Thought-Gathering” Sheet

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

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 fulfill 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.
Using gathered data, what are the economic factors that need to be considered when evaluating the football program?

<table>
<thead>
<tr>
<th>What are the costs?</th>
<th>What are potential profits?</th>
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<tbody>
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</table>

What are other factors? Can they be easily measured?

<table>
<thead>
<tr>
<th>What are other factors?</th>
<th>Can they be easily measured?</th>
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</table>

★ How could you assess how people in the community view the issue?
Problem-Based Learning

Student Responses
(“Product Option”)

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

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):

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

After you divide your students into teams, photocopy the next page to outline the Product Option for this scenario.
Working to produce 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 in the Athletic Office for a school district. As part of your duties, you must conduct an analysis of the football program at a sample school. This analysis will include the cost and revenue of the games, the time factors involved (specifically whether the program is taking time away from other activities), and the overall student participation. You can use data from the Stimulus Items, as well as your best estimates from a local school.

Using this analysis, decide whether the football program is a good investment, at least from a “numbers” perspective. Prepare a chart, table, graph, or other visual aid that defends your position. You must present your findings to the school board (i.e. your classmates).

Consider what other factors (tradition, sportsmanship, school spirit, etc.) might be difficult to measure, but should be factored into the decision as to whether the football program should be continued.
We mention this time and time again through 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 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 / Perseverance
- 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
- Listening

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:**

<table>
<thead>
<tr>
<th>Thoroughness</th>
<th>Evidence</th>
<th>Strategy</th>
<th>Teamwork</th>
</tr>
</thead>
<tbody>
<tr>
<td>_______ The group completed all of the required tasks</td>
<td>_______ The group’s final product was logical and could be defended</td>
<td>_______ The group kept its focus on the requirements of the product</td>
<td>_______ Everyone in the group participated and played a key role</td>
</tr>
<tr>
<td>(15 points)</td>
<td>(15 points)</td>
<td>(15 points)</td>
<td>(10 points)</td>
</tr>
<tr>
<td>_______ Everyone followed directions throughout the process</td>
<td>_______ A variety of evidence was provided to support the product</td>
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</tr>
<tr>
<td>(15 points)</td>
<td>(10 points)</td>
<td>(10 points)</td>
<td>(10 points)</td>
</tr>
</tbody>
</table>

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:

- Forces and Motion
- The Human Body (sports injuries)

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 hallmark 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.
The Scenario:

You are a member of the school board in a district that is considering the option of eliminating high school football throughout the district. What are the reasons that might be given on both sides of the issue to continue or eliminate the football program? 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:

Is football too dangerous of a sport?

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 safety issues dealing with football and compare it with other sports, and then decide if football is safe or too dangerous to be played by high school students.

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

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: football
Password: bg48

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

**Stimulus Item #1**  
— “Football and Concussions” (video)

**Stimulus Item #2**  
— “A look at sports injuries” (infographic)

**Stimulus Item #3**  
— “The evolution of the football helmet” (article)

**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!
### The Science Angle

#### Step 1
Absorb the information

#### Step 2
Evaluate the information

#### Step 3
Generate the response

Now that your students have reviewed the Stimulus Items, 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.

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**Example:**

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Leading Questions for Classroom Discussion
The Football Program (science angle)

Football has the reputation of being a “dangerous” sport. In what ways isn’t it dangerous?

- Consider that football is a contact sport, which means that certain injuries (most of them minor) are inevitable even when proper safety precautions are taken.
- Consider that some sports are very safe (golf, track & field, tennis, etc.) but other sports (wrestling, hockey, skateboarding, etc.) have high injury rates that can be closely compared with high school football.
- Consider that the vast majority of football injuries are minor, which is true with most other sports played at the high school level.

How can the study of forces and motion in science be used to reduce injuries on the football field?

- Consider that most injuries in football are due to impact, which means that it is simply two people colliding (a combination of force and motion).
- Consider that understanding the exact nature of how forces and motion cause injuries on the football field can result in better safety equipment in the form of helmets and pads.
- Consider how players understanding the basic elements of forces and motion applied on a football field can lead to better—and safer—football techniques.

What measures can be taken to reduce injuries on the football field? What precautions might be too drastic?

- Consider that proper safety equipment has drastically lowered the number of sports injuries, and the equipment continues to improve.
- Consider that many injuries occur during certain parts of the game (for example, a high number of injuries occur during punt returns), so perhaps rule changes can be used to reduce injuries.
- Consider that many injuries can be avoided by using correct techniques and making sure that teams are relatively balanced in age, skill, and size.
- Consider that there is a point where precautions become too drastic, such as when they interfere with the flow of the game (such as a player wearing so many pads that he can’t move, or new rules that don’t allow players to make any contact).
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 centering around the Problem-Based Scenario that the students answer through their writing. Most likely, the Extended Responses are similar to what you might see during 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).
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) How can the study of forces and motion in science be used to reduce injuries on the football field?

2) Based on the statistics, is football more dangerous than other sports? Is it too dangerous to play? What can be done to reduce the injuries?

Remember to support your answers with evidence that you’ve gathered from what you’ve read and discussed in class!
One thing that your students must understand about these Problem-Based Scenarios is that the answer is never simply “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 a pat on the back—and that’s why proper grading is so important. While students may feel that grades exist only to cause stress and fill the blank spaces on a report card, the broader reason is that when students are graded in a clear and fair way, it enables them to continually 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.
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

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

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

<table>
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<th>3</th>
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<th>NS</th>
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<tbody>
<tr>
<td>Your response had a defined purpose, and it was organized with a clear focus on that purpose.</td>
<td>Your response had a defined purpose, although it lacked organization and a clear focus on that purpose.</td>
<td>The purpose of your response was vague, or there was limited organization and focus.</td>
<td>There was no defined purpose or organization in your response.</td>
<td>Your response was incoherent, off-topic, or unable to read.</td>
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**Rubric Section #3: Integration of Knowledge & Ideas (use of “evidence”)** – you must support your arguments and positions with outside information (i.e. “stimulus items”)

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<th>3</th>
<th>2</th>
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<td>Your response was incoherent, off-topic, or unable to read.</td>
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</table>

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

<table>
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<th>4</th>
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<tbody>
<tr>
<td>Your response was professional and you demonstrated a command of language conventions.</td>
<td>Your response was mostly professional with limited errors related to language conventions.</td>
<td>Your response was rather sloppy with multiple errors related to language conventions.</td>
<td>Your response was completely sloppy and showed no effort to follow language conventions.</td>
<td>Your response was incoherent, off-topic, or unable to read.</td>
</tr>
</tbody>
</table>
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:

- History (local traditions)
- Social Responsibility (lessons taught by team sports)

In addition—and perhaps more importantly—students will need to understand basic principles of social studies, which is a hallmark of Problem-Based Learning. This means that in addition to the basic disciplinary 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 this broader 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.

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

You are a member of the school board in a district that is considering the option of eliminating high school football throughout the district. What are the reasons that might be given on both sides of the issue to continue or eliminate the football program? 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. For example, we will consider the following:

**Something to think about:**

How valuable are football traditions and the lessons taught by the team sport?

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 social elements of football, such as the lessons learned on the field and the longstanding traditions that are created. You will then determine the value of these abstract benefits.

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

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: football
Password: bg48

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

Stimulus Item #1
— “Football - a high school tradition” (article)

Stimulus Item #2
— "Is high school football significant?" (online forum)

Stimulus Item #3
— “Why Sports are Important” (video)

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!
“Thought-Gathering” Sheet

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

The 1-2-3 of Problem-Based Learning

- **Step 1**: Absorb the information
- **Step 2**: Evaluate the information
- **Step 3**: Generate the response

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 fulfill 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.
What words come to mind when you think of “football”?

Are these mostly positive or negative?

What lessons can you learn while playing on a football team?

<table>
<thead>
<tr>
<th>Lessons of Football</th>
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</table>
The Student Responses are Section 3 on your Teacher Instruction Sheet.

The 1-2-3 of Problem-Based Learning

Step 1
Absorb the information

Step 2
Evaluate the information

Step 3
Generate the response

Student Responses
(“Product Option”)

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

You are part of a **Writers’ Group**, which is a support network of aspiring writers who work to develop their craft. For its most recent project, your group wants to use writing to capture the excitement, competitiveness, and other emotions that are a part of high school football.

One of the best ways to illustrate this wide range of feelings is through poetry or short narratives. Work with your group to **write a poem or short story** about some of the abstract elements of football (such as sportsmanship, teamwork, school spirit, confidence building, enthusiasm, tradition, etc.).

Be prepared to share your work with the class. Discuss whether these abstract elements should be considered when deciding whether or not a school district should have a football program. Consider that many schools have rivalries and football traditions that go back generations. Should these traditions be considered when deciding the future of the sport at the school?
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 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 / Perseverance
- 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
- Internet / Media Literacy
- Data Analysis
- 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:

<table>
<thead>
<tr>
<th>Thoroughness</th>
<th>Evidence</th>
<th>Strategy</th>
<th>Teamwork</th>
</tr>
</thead>
<tbody>
<tr>
<td>_______ The group completed all of the required tasks (15 points)</td>
<td>_______ The group’s final product was logical and could be defended (15 points)</td>
<td>_______ The group kept its focus on the requirements of the product (15 points)</td>
<td>_______ Everyone in the group participated and played a key role (10 points)</td>
</tr>
<tr>
<td>_______ Everyone followed directions throughout the process (15 points)</td>
<td>_______ A variety of evidence was provided to support the product (10 points)</td>
<td>_______ The group used a sound approach in completing the exercise (10 points)</td>
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</tbody>
</table>

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.
Student Responses
Language Arts

In previous sections of this book, students have only concentrated on one piece of the puzzle: now they 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, a prompt has been provided (shown to the right). Your students’ written responses, and perhaps oral presentations — will need to meet several expectations from a Language Arts perspective. Students must:

- Show the ability to comprehend informative texts and resources
- Explain their position and overall reasoning
- Support their positions with evidence from their 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

1. Absorb the information
2. Evaluate the information
3. Generate the response

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.

Here is the Language Arts prompt for this Problem Scenario.
After reviewing the evidence, decide whether or not your school district should have a football program at the high school level.

When your decision is made, write an **informative essay** to share your viewpoint with the general public within the school district. The essay should clearly state the reasons and evidence that were used to make your decision, and why it is in the best interest of the students.
How long will it take?

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 options and flexibility. Obviously, the time will greatly vary if you just do a “subject-specific problem” (i.e. one section of this book) or do the entire integrated Problem Scenario (i.e. the whole book). Consider these guidelines:

1 or 2 periods/ blocks

1 week

2 weeks or more

A specific “subject angle”, focusing only on the stimulus review and classroom discussion

All steps of a single “subject angle”, with students answering the “Extended Response” questions

An entire PBL Integrated Scenario, with students completing the Product Options, collaborating in groups, and giving presentations

If you’re cramped for time, you may concentrate on one section of this book (the “subject angle”), and probably won’t be able to dive into the Product Option. Still, this will be a great introduction into Problem-Based Learning for your students.

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.
Great Job!

Problem-Based Scenario – “The Football Program”

By completing this entire scenario, you have demonstrated that you have the ability to approach a real-world problem and provide a clear and logical response to the challenge.

Awarded to [Recipient's Name]

for completion of the following:

Problem-Based Scenario – “The Football Program”

Given this date [Date] in the year [Year]

Signed [Signatory's Name]