



STEAM Challenge Digital Storytelling Unit

A Burning Documentary

Designed for Middle and High School Students

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Introduction

This Digital Story Telling Challenge will take two to four weeks to complete. This Challenge targets key Human Life Skills – creativity, collaboration, critical thinking, digital literacy, and presentational skills – in equal measure with the curricular content. Delivering on all those learning goals requires student immersion and time. The results, as based on our research, are a high level of student engagement, deep learning, and 100% teacher endorsement.

The following Challenge:

- Should be completed by collaborative teams of two to four students but can be completed independently, if desired.
- Is aligned to nationally recognized Curricular Standards.
- Contains an Evaluation Rubric that allows the teacher to clearly score and appraise the students' work.
- Is designed to be integrated into the classroom in alignment with existing curricula.
- Can be assigned as an extra credit project to teams of students that you think would benefit from this kind of immersive, deep learning experience. Additionally, will work well in informal educational settings.
- Should follow the rules of Digital Citizenry in their proper usage and/or citation of images, music and text taken from other sources. See the Digital Rules area in the free Media Resources section of the Meridian Stories site for guidance.

The [Media Resources](#) section also contains many other **free support materials** from short videos featuring professionals in the field – Artists and Innovators– to short written documents that cover everything from storyboarding to creative brainstorming, interviewing techniques to game design.

While it is helpful to have a Technology Integrator involved, they are not usually necessary: the students already know how to produce the media. ***The teacher's primary function in these Challenges is to guide the students as they engage with the content. You don't need to know editing, sound design, shooting or storyboarding: you just need to know your content area.***

At the end of the Challenge, it is often fun and useful to have a screening of all the media productions – they are all designed to run under 4 minutes each.

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Students can vote for their favorite videos that can then be screened in a larger assembly-like setting for the whole grade to see. Or this work can be presented as part of a student showcase for parents and friends. Presentational Skills is another Human Life Skill that this project enables.

Our research indicates this to be a really useful exercise for two additional reasons:

1. Students actually learn from their peers' presentations – it is useful to hear a perspective that is not just the teacher's; and
2. The public setting – painful as it is for some students – provides them with an opportunity to 'own' their work and to be more accountable.

Finally, if you are interested to learn more about the community of schools who annually participate in the [Meridian Stories Competitions](#) – a community that is characterized by a friendly competitive spirit; feedback from Mentors on each submission; and the rewarding of digital badges in content, storytelling and digital literacy – please return to the Competitions section of the website or inquire at info@meridianstories.com.

Let's get started.

The Challenge

Here's the problem: your good buddy has eaten 1000 calories too many in the past half hour. As an aspiring health instructor, you are testing out a plan to burn 1000 calories in four hours, so you direct your buddy on how you think they should burn the calories. Below you are given a compilation of how many calories can be burned through different activities and you must choose three activities that will burn these 1000 calories in that time period. You can also choose your own activities and find out how many calories they will burn by exploring <http://calorielab.com/burned/>. One activity must be performed for exactly one and a half hours, but how you split the remaining time between the other two activities is up to you.

So your requirements are:

- Three activities must take up exactly four hours;
- Three activities must burn exactly 1000 calories; and
- One activity must last for exactly 1 hour and 30 minutes.

Your task is to create a short-format film that documents and narrates your team’s attempt to perform the activities for the calculated times. End with a report of whether or not it was a reasonable way to lose 1000 calories in 4 hours. Would you recommend this as an exercise regimen to health instructors? If not, how would you alter it?

You have 90 seconds to communicate the results of your entire four hours of activity, and the video must also explain the mathematical calculations involved in creating and solving your system of equations. If you can obtain an actual calorie counter to measure your calorie-burning progress, test your mathematical calculations that way and include that in the video.

Here are some suggested activities to consider:

Activity	Calories Burned
Jogging	450
Tennis	395
Ultimate Frisbee	485
Gardening	205
Juggling	200
Darts	100
Playing Piano	105
Backpacking	495
Leisure Biking	280
Jazzercise	420
Running (~9min/mile)	770
Badminton	315
Roller blading	480
Trampoline	245
Playing guitar	70
Baking	110

The activity table represents the amount of calories burned if the activity is performed for one hour by a person of average weight (~150lbs).

Deliverables include:

- A Burning Documentary
- Draft Shooting Script (at teacher’s discretion)

The Process

Below is a suggested breakdown for the students’ work.

During Phase I, student teams will:

- Translate the given information into a system of three equations
 - There should be three variables (one for each activity) that represent the time spent on each activity, and a constant associated with each activity/variable
- Choose three activities and see if you can solve the system of equations. If you can't solve it, repeat with another set of activities until you successfully solve the system
 - If you choose your own activities from calorielab.com/burned, be sure to enter the weight of the person completing the activities. Create your own chart with the information you find on the website.
 - You are encouraged to test out multiple sets of three activities, but you only have to document one set.
- Brainstorm about the format for the video. The basic format that you are going to want to follow is this:
 1. Present the mathematical equations that will determine your proposed 4 hours of activity.
 2. Document a team member going through the 1,000 calorie burn plan.
 3. Conclude on the efficacy of the plan: as a health instructor, would you recommend that others should follow this plan? What are the strengths and weaknesses of the plan in terms of actual implementation?

During Phase II, student teams will:

- Cast the video – decide which person (or people) will attempt the activities based on your mathematical calculations of how to burn 1000 calories
- Decide what tone you want to convey
 - Is your buddy excited to try out this regimen? Annoyed?
- Draft the key points of the video that can be scripted (since this is primarily a documentary, some of this will be adlibbed), keeping in mind that you must communicate what is happening in each of the activities

and explain the mathematics involved in calculating how long each activity must be performed.

- Finalize the script draft.
 - **Teacher's Option:** Draft Shooting Script – Teachers may require that teams hand in their Draft Shooting Script
- Pre-produce the scene:
 - Scout locations for shooting;
 - Obtain all necessary equipment for each activity;
 - Optional: Obtain a calorie counter to test whether your mathematical calorie-burning regimen actually burns 1000 calories.
 - Create costumes, props and other set pieces, as needed;
 - Prepare the logistics for the actual shooting of select moments during the four hours of activity, as well as intro and outro moments; and
 - Rehearse the scripted parts of the documentary.

During Phase III, student teams will:

- Perform the three activities for the calculated times and shoot the video.
- If you used a calorie counter, report its findings. If it didn't report burning 1000 calories, hypothesize what went wrong.
- Report back on how the calorie plan went and whether you would alter anything given another try.
- Edit the video, adding stills and graphics as desired.
- Post-produce the video, adding music and sound effects as desired.

Meridian Support Resources

Meridian Stories provides two forms of support for the student teams:

1. Meridian Innovators and Artists – This is a series of three-to-four-minute videos featuring artists and innovative media professionals who offer important advice, specifically produced for Meridian Stories, in the areas of creativity and production.
2. Media Resource Collection – These are short documents that offer student teams a few key tips in the areas of creativity and production.

Recommended review, as a team, for this Challenge include:

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Meridian Innovators and Artists	Media Resource Collection
<p><i>On Documentary Films</i> – Sarah Childress</p> <p><i>On Non-fiction</i> – Margaret Heffernan</p> <p><i>On Making Documentaries</i> – Margaret Heffernan</p>	<p>“Creating a Short Documentary”</p> <p>“Six Principle modes of Documentary Filmmaking”</p> <p>“Creating Storyboards, Framing the Shot”</p>

Evaluation Rubric – *A Burning Documentary*

CONTENT COMMAND			
Criteria	1-3	4-7	8-10
Creation of System of Equations	The system of equations does not accurately represent the word problem or the creation process is not explained at all	The system of equations accurately represents the word problem but the creation process is not fully explained	The system of equations accurately represents the word problem and the creation process is well-explained
System of Equations Solution	There is little to no explanation of how the system of equations was solved, or the system was solved incorrectly	The solution to the system of equations is present and correct, but may not be fully explained	The solution to the system of equations is thoroughly explained
STORYTELLING COMMAND			
Criteria	1-3	4-7	8-10
Story - Scripting and Narrating	The scripting and voice over are ineffective and not engaging	The scripting and voice over services the content	The scripting and voice over is compelling and effective
Story Format	The video does not coherently present the mathematical set-up, actual calorie-burn process and conclusion	The video does coherently present the mathematical set-up, actual calorie-burn process and conclusion	The video presents the mathematical set-up, actual calorie-burn process and conclusion in an engaging and compelling way

MEDIA COMMAND			
Criteria	1-3	4-7	8-10
Visual Shot Selection	The visual shots do not effectively communicate the content	The visual shots communicate the content	The visual shots effectively and engagingly communicate the content
Music and Sound Effects	The music and sound effects inconsistently contribute to the narrative	The music and use of sound effects are good and support the narrative	The music and sound effects are exceptional and enhance the narrative
HUMAN SKILLS COMMAND			
Criteria	1-3	4-7	8-10
Collaborative Thinking	The group did not work together effectively and/or did not share the work equally	The group worked together effectively and had no major issues	The group demonstrated flexibility in making compromises and valued the contributions of each group member
Creativity and Innovation	The group did not make a solid effort to create anything new or innovative	The group was able to brainstorm new and inventive ideas, but was inconsistent in their evaluation and implementation of those ideas.	The group brainstormed many inventive ideas and was able to evaluate, refine and implement them effectively
Initiative and Self-Direction	The group was unable to set attainable goals, work independently and manage their time effectively	The group required some additional help, but was able to complete the project on time with few problems	The group set attainable goals, worked independently and managed their time effectively, demonstrating a disciplined commitment to the project

Essential Questions

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1. How do you translate a word problem to a system of linear equations?
2. How do you solve a system of equations?
3. What criteria make for an engaging and informative short-format video?
4. How has immersion in the creation of original content and the production of digital media – exercising one’s creativity, critical thinking and digital literacy skills - deepened the overall educational experience
5. How has working on a team – practicing one’s collaborative skills - changed the learning experience?

Student Proficiencies

1. The student will practice the skills involved in understanding a word problem and translating a word problem to equations.
2. The student will gain experience with methods for solving systems of linear equations such as substitution, elimination, graphing, and matrix row-reduction operations.
3. The student will exercise thoughtful prioritization as part of a decision-making process focused on elaborating only upon key concepts.
4. The student will utilize key 21st century skills, with a focus on creativity, critical thinking and digital literacy, in their process of translating STEAM content into a new narrative format.
5. The student will have an increased awareness of the challenges and rewards of team collaboration. Collaboration – the ability to work with others - is considered one of the most important 21st century skills to develop in students as they prepare for life after secondary school.

Curricular Correlations

The *A Burning Documentary* Challenge addresses a range of curricular objectives that have been articulated by the Common Core State Standards Initiative: Mathematics.

Below please find the standards that are addressed, either wholly or in part.

Common Core State Standards: Mathematics Overall Standards for Mathematical Practice

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

Grade 6

- Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true (6.EE.B.5)
- Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set (6.EE.B.6)
- Use variables to represent two quantities in a real-world problem that change in relationship to one another (6.EE.C.9)

Grade 7

- Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (7.EE.B.3)
- Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities (7.EE.B.4)

Grade 8

- Analyze and solve pairs of simultaneous linear equations (8.EE.C.8)

High School

- Create equations in two or more variables to represent relationships between quantities (HSA.CED.A.2)
- Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context (HSA.CED.A.3)
- Solve systems of linear equations exactly and approximately (HSA.REI.C.6)

- Represent a system of linear equations as a single matrix equation in a vector variable (HSA.REI.C.8)