Library Fair Project
Winter 2019
Total Possible Points: 100 points

Goal of the Project:

The goal of this project is to create a poster about a mathematical or statistical topic related to the time period of 1939-1945 (the World War II Era, but your project does not have to be about World War II) that will be displayed during the Library Fair to meet the common degree outcome requirements for this course. Your display should include **at least 5 nicely displayed pictures** on a **36" by 48"** OR **40" by 28" tri-fold poster board**, **at least 10 nicely displayed facts**, and **twenty copies of a typed 200 - 250-word summary of your research** for people to take to with them to read. **Using anything except the correct sized tri-fold power board will result in an automatic zero for the entire project**.

EXAMPLES OF WHAT TO USE:

EXAMPLES OF WHAT NOT TO USE (Using anything except the correct sized tri-fold power board will result in an automatic zero for the entire project):

Poster Presentation Tips

In general, I would recommend making sure that all the space on the Poster board is used up without too much blank space being left. This may mean that you need to put a border around the outside edge or put a nice background behind any of the facts or pictures that you put on your poster board. A general rule is that any text on the poster board should be at least 24-point font so that it is relatively easy to read from far away. You may wish to check out the websites below for additional poster presentation tips if you are unsure of what to do:

Poster Presentations (Eastern Kentucky University)
http://people.eku.edu/ritchisong/posterpres.html

Creating Effective Poster Presentations
https://projects.ncsu.edu/project/posters/

How to Make A Poster (Eastern Connecticut University)
http://www.easternct.edu/undergraduateresearch/how-to-make-a-poster/

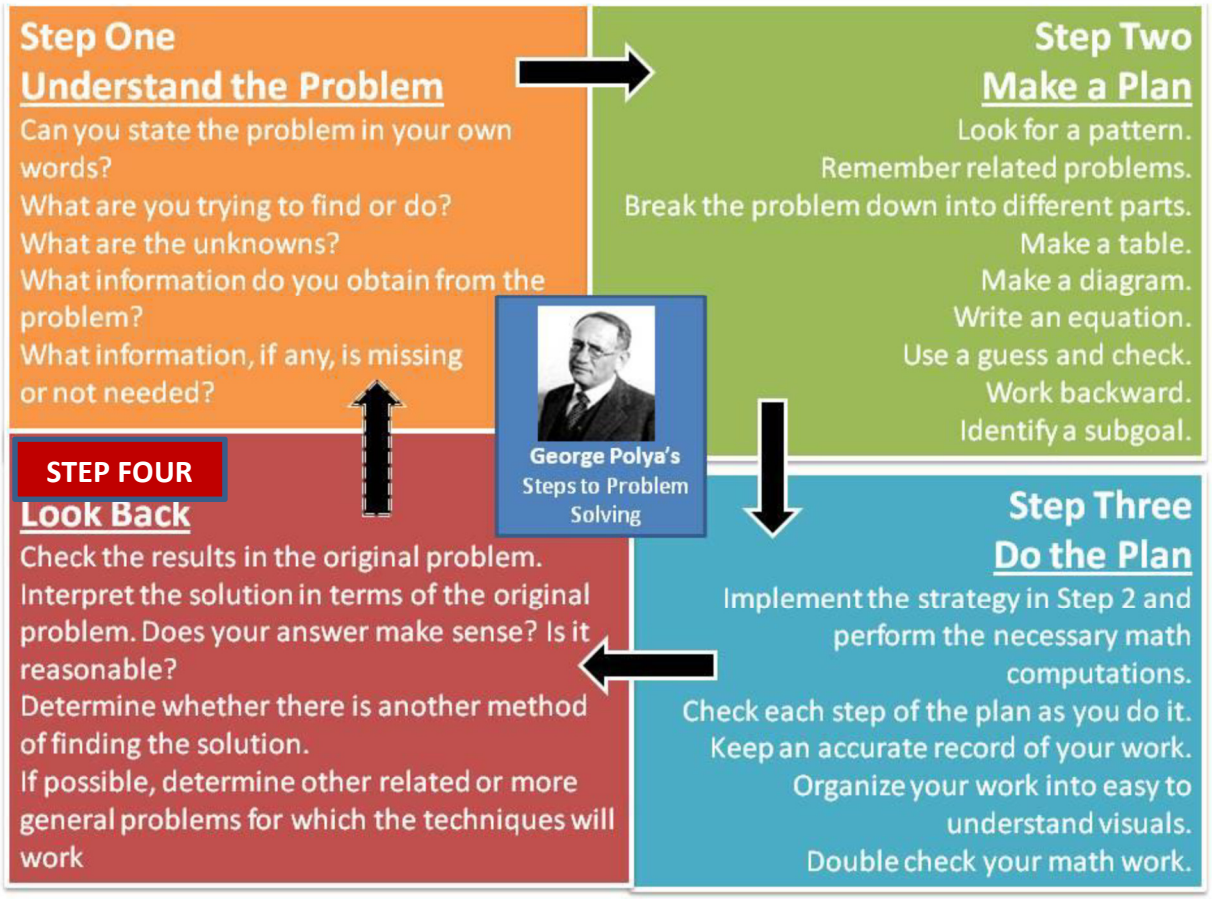
Presenter Resources (Society for Neuroscience)
http://www.sfn.org/resources

Poster Presentations - Designing Effective Posters
https://research.lib.buffalo.edu/poster-presentations

Tips for Presenting Your Research in a Poster Presentation
https://evergreen.edu/sites/default/files/institutionalresearch/pdf/Tips%20for%20Preparing%20a%20Poster%20Presentation.pdf

Poster Presentation Tips
https://www.uvi.edu/files/documents/ECS/DrTurnerPosterGuide.pdf

While doing this project, you may wish to focus on the four-step problem solving process below:



GRADING:

20 points = 250-word proposal due on time. Your proposal needs to describe your idea for a project and why you have chosen it. Make sure to include how a new, innovative, or creative idea as it relates to mathematics or statistics and to the time period of 1939-1945 will be integrated into your project.

20 points = Rough Draft/Sketch/Mock-up due on time. At this point you should turn in a listing of any text and pictures prepared that you are planning to include on your final tri-fold poster, as well as a rough sketch of how you plan to arrange everything on your poster. Try to aim for **a minimum** of about 10 facts or ideas and 5 related pictures. Remember, your poster needs to be informative, but not cluttered and overwhelming.

20 points = Final project turned due on time.
10 points = At least 5 nicely displayed pictures.
10 points = At least 10 nicely displayed facts.
10 points = Quality, content, and correctness of final project.
10 points = twenty copies of 250-word summary

Background:

"The 1930s saw a reinvigorated Germany begin to re-arm under the leadership of the Nazi Party and Adolf Hitler. This included continuing to build on efforts begun in the 1920s to create secure communications. Germany had suffered significant losses to its submarine fleet in World War I (1914-1918) because of the ability of the Western allies, especially France and Great Britain, to take advantage of weaknesses in the codes and ciphers the Germans had used to try to protect the secrecy of their communications. In addition, a primary reason for the entry of the United States into the war had been the ability of the British to read a secret German diplomatic cable (the Zimmermann Telegraph). The Germans were determined to correct this problem and make sure that in any future war they would be able to pass messages amongst themselves while keeping others from being able to read those messages."

It was Polish mathematicians Marian Rejewski, Henyrk Zygalski, and Jerzy Rozycki who lead the initial charge to break the Germans' codes; however, it was ultimately the British mathematician Alan Turing who was able break the code with his 'Turing Machine.' More information can be found on the NSA website at https://www.nsa.gov/about/cryptologic-heritage/historical-figures-publications/publications/wwii/how-math-helped-win.shtml

Some Sample Project Ideas and Suggestions are Below:

1. Read the article, "The Mathematical Sciences and World War II" by Mina Rees, published in *The American Mathematical Monthly*, Vol. 87, No. 8 (Oct., 1980), pp. 607-621. Please note that the Macomb College Library has this article and it could be a good starting point for your research. You could even just look at specific points that the article makes and not even the entire article.

2. Research one of the famous Mathematicians of the World War II Era and present information on their major mathematical contributions. Although you can provide some biographical information about the person, remember that the focus needs to be on the person's major mathematical contributions.

Here is a short list of male mathematicians during this era:

- Arthur Scherbius
- Marian Rejewski
- Henryk Zygalski
- Jerzy Rozycki
- Alan Turing

3. You may wish to research some of the famous statisticians of the World War II Era, such as Frederick Lindemann, Frederick Marquis, Claus Moser, George Box, Abraham Wald, and Herbert Marshall. This article from *The Economist* could be a good start for this: https://www.economist.com/christmas-specials/2014/12/17/they-also-served. Just as for the

mathematicians, remember that although you can provide some biographical information about the person, remember that the focus needs to be on the person's major statistical contributions.

4. Research the mathematics of a specific country during the World War II Era. For example, this website gives information on Mathematics in France during World War II: http://www-history.mcs.st-andrews.ac.uk/Extras/France_World_War_II.html

5. You may also wish to focus on the mathematics that was *not* done during the World War II Era due to the war. e.g. *Bourbaki: the pre-war years* tells the story of Bourbaki who could not work during World War II because some members of his project group were separated in the United States. More information can be found at http://www-history.mcs.st-andrews.ac.uk/HistTopics/Bourbaki_1.html. Or here is another example in the dedication of this article: https://academic.oup.com/qjmath/article-abstract/os-16/1/1/1565363?redirectedFrom=fulltext

6. Again going another direction, you may wish to focus on the Japanese mathematicians during the World War II Era. There are some interesting ones, such as Yozo Matsushima and Mikio Sato. If you are looking for an article on this topic, there are many including "Mathematics and War in Japan" by Setsuo Fukutomi.

7. You could present statistics about World War II, such as total war deaths by nation, tank production, etc. The websites have some information that could get you started; however, remember that you may wish to check the facts found on each website against each other and against other sources to make sure they are accurate.

https://www.secondworldwarhistory.com/world-war-2-statistics.php

http://www.world-war-2.info/statistics/

https://www.historyonthenet.com/world-war-two-statistics-data/

https://www.cnn.com/2013/07/09/world/world-war-ii-fast-facts/index.html

https://www.nationalww2museum.org/students-teachers/student-resources/research-starters/research-starters-worldwide-deaths-world-war

https://www.shmoop.com/wwii/statistics.html

http://www.historyplace.com/worldwar2/timeline/statistics.htm

8. Research the rise of mathematics awareness during the World War II, through the establishment of things such as the Applied Mathematics Panel, and the American Mathematical Association (AMA) and Mathematical Association of America (MAA) War Preparedness Committee and War Policy Committee. Some additional information can be found in this Notice of the AMS: https://www.ams.org/publications/journals/notices/201704/rnoti-p363.pdf

9. Research one specific mathematical topic from the period 1939 – 1945 and present your findings on the topic. It is OK if you don't understand everything about the topic, but it is NOT OK to

plagiarize. Your job is to investigate the topic and summarize its importance in the development of mathematics. A listing of topics from these years can be found at the MacTutor History of Mathematics archive at http://www-history.mcs.st-andrews.ac.uk/Chronology/index.html, but it is also below:

1939

Douglas gives a complete solution to the Plateau problem, proving the existence of a surface of minimal area bounded by a contour.

Abraham Albert publishes Structure of Algebras.

1940

Baer introduces the concept of an injective module, then begins studying group actions in geometry.

Aleksandrov introduces exact sequences.

1941

Linnik introduces the large sieve method in number theory.

Abraham Albert starts work on nonassociative algebras.

1942

Steenrod publishes a paper in which "Steenrod squares" are introduced for the first time.

Eilenberg and Mac Lane publish a paper which introduces "Hom" and "Ext" for the first time.

1943

Marshall Hall publishes on projective planes.

Naimark proves the "Gelfand-Naimark theorem" on self-adjoint algebras of operators in Hilbert space.

1944

Von Neumann and Morgenstern publish Theory of Games and Economic Behaviour. The theory of games is used in the study of economics.

Artin studies rings with the minimum condition, now called "Artinian rings".

1945

Eilenberg and Mac Lane introduce the terms "category" and "natural transformation".

Other Interesting Websites and Articles with Tidbits

https://www.wired.com/2010/10/how-the-allies-used-math-against-german-tanks/

https://www.explorica.com/blog/math-won-war

Here is a female mathematician from the WWII era:

Cartwright, Mary (1900 – 1993) – During WWII, British soldiers needed more powerful amplifiers, so signals would not become jumbled. This problem was considered critical to winning the war. Mary rose to the challenge. She had a skill for combining mathematical concepts together in unusual ways. She and her friend J.E. Littlewood provided the British army with enough information to get around the problem; however, their publication in 1945 became known as "chaos theory," the idea that tiny fluctuations can cause widely varying outcomes.

https://www.encyclopedia.com/history/encyclopedias-almanacs-transcripts-and-maps/cartwright-mary-lucy

http://www.cns.gatech.edu/PHYS-4267/Cartwright.html

FINAL NOTES:

- Most any idea is likely to be approved as long as it relates to mathematics or statistics and the time period of 1939 - 1945.
- It may help to use the 4 problem solving techniques: Understand the Problem, Make a Plan, Do the Plan, and Look Back.
- Using pictures, equations, data, graphs, and charts to get your point across always helps.
- Since you will be dealing with historical data here, timelines can be useful as well.

Library Fair Rubric **Name: _____**

Winter 2019

Total Possible: 100 points

Library Fair Rubric

	0	5	10	20
Your proposal was turned in on time	More than 2 days late	2 days late	1 day late	Yes
Your rough draft was turned in on time	More than 2 days late	2 days late	1 day late	Yes
Your final project was turned in on time	More than 2 days late	2 days late	1 day late	Yes
Clarity				
Your display is clear, nicely presented, easy to follow, and all new terminology and notation was defined.	Your display was not clear or nicely presented or was not the specified size.	Your display is clear and nicely presented, but **was not** easy to follow, or all new terminology and notation was not defined.	Your display is clear and nicely presented, **was** easy to follow, and all new terminology and notation was defined.	
Style and Organization				
Your display includes at least 5 nicely presented pictures and 10 facts and looks like it is well organized and well planned.	Your display is missing more than 1 picture or more than 1 fact.	Your display is missing no more than 1 picture and 1 fact or looks like it is was not well organized and well planned.	Your display has at least 5 nicely presented pictures and 10 facts and looks like it is well organized and well planned.	
Statistics				
Your display is free of any mathematical errors and explains a use of statistics.	Your display has more than 1 major mathematical error.	Your display has a major mathematical error or does not explain a use of statistics.	Your display has no major mathematical errors and explains a use of statistics.	
Overview				
Your brief 200 – 250 word summary uses proper spelling and grammar and gives an overview of the context of your project.	Your summary has **major mistakes** and cannot be understood or is **less than 200 words** or **was not typed.**	Your summary includes **minor errors** in either spelling or grammar or does not give an overview of the context of your project.	Your summary includes **both** proper spelling and grammar and gives an overview of the context of your project.	