

**SWISI Project Report
Elrose Composite School 2013-14**

Project Overview

Students will work in small groups to cooperatively to complete a Fermi math problem. Fermi math challenges students to solve seemingly complicated questions using estimation, rounding, approximations, analytical thinking, creative thinking, communication, and technology skills. The students will investigate the **driving question**:

If you wanted to send a valentine card to each person in the world next year:

- how many boxes of packaged valentines will you need to purchase?
- how much will it cost for you to purchase and mail all of the cards?
- if everyone in the world sent a valentine to everyone else in the world, how many valentines in total would be sent?

Project Outcomes

Name of Project: *Fermi Valentine's Day Challenge*

The students will be able to:

- make a guess without making any calculations or using any reference materials
- make an educated guess based on information they already know, reasoning, and rough estimates
- determine what variables they need to gather information on and what formulas might help them solve the problem
- do research and look at a sample size
- do calculations (with and without technology) to work out their solutions
- use all the gathered information, formulas, calculations, estimates, etc... to determine a final answer
- communicate their results clearly, be able to explain the steps they took to get their answer and justify their answer
- make a model (poster, PowerPoint, Presi, diagram, etc...) showing/justifying their work

The students will demonstrate:

- the use of various types of reasoning (e.g., inductive, deductive, etc.) as appropriate to the situation
- the ability to solve non-familiar problems in both conventional and innovative ways
- the ability to identify and ask significant questions that clarify and lead to better solutions
- imagination and curiosity
- the ability to develop, implement, and communicate new ideas to others effectively
- the ability to work effectively and respectfully with group members
- flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal
- responsibility for collaborative work, and value the individual contributions made by each team member
- the ability to reason with numbers and other mathematical concepts

Curriculum Outcomes

(Curriculum document available at: <http://www.curriculum.gov.sk.ca>)

The students will:

- write and say the numeral for a quantity using proper spacing without commas and without the word “and”
- pose and solve problems that explore the quantity of whole numbers to 1 000 000; *solve situational questions involving operations on quantities larger than one million*
- *Solve situational questions involving multiple operations, with and without the use of technology.*
- provide examples of large numbers used in print or electronic media and explain the meaning of the numbers in the context used.
- pose a problem which requires the multiplication of 2-digit numbers and explain the strategies used to multiply the numbers.
- identify situations in one’s life, family, or community in which division might be used and explain the reasoning.
- justify the choice of what to do with a remainder for a quotient depending upon the situation
- solve a division problem that is relevant to self, family, or community using personal strategies and record the process symbolically.
- develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results; *estimate the solution to a situational question, without the use of technology, involving operations on quantities larger than one million and explain the strategies used to determine the estimate*
- determine an approximate solution to a problem not requiring an exact answer and explain the strategies and reasoning used
- gather information from a variety of media
- listen purposefully to instructions and procedures and decide the best way to carry them out.
- use inquiry to explore a problem, question, or issue related to a topic being studied in English language arts or a topic of personal interest including:
 - summarizing personal knowledge and understanding of a selected topic to help formulate relevant questions appropriate to a specific audience and purpose for group or individual inquiry or research
 - gathering and recording ideas and information using a plan

- answering inquiry or research questions using a variety of sources such as the internet, interviews, and field trips
- determining the usefulness of ideas and information for inquiry or research purpose and focus using pre-established criteria
- using a variety of tools to access ideas and information
- organizing ideas and information into categories (e.g., what, where, when, how, so what)
- making notes using own words and providing publication dates and authorship of sources
- assessing knowledge gained through inquiry or research
- explaining findings from inquiry or research on a topic, question, problem, or issue in an appropriate visual, oral, and written format.
- consider which form (e.g., drama, drawings, dance, diagrams, music, three-dimensional objects, posters, cartoons, maps, graphs, photographs, pictures, charts, and videos) is most appropriate for various tasks and identified purposes.
- use computers and authoring software to compose texts and graphic representations.
- include charts, graphs, tables, maps, graphics, and illustrations in researched inquiry presentations if appropriate

Pre-requisite Skills (Skills needed to complete project)

- grade level reading ability
- basic skill with technology
- grade level understanding of mathematical operations
- basic collaboration (group work) skills

Required Material

- Project planning forms
- Project rubrics and assessment criteria

Required Technology and Support

- Computer lab
- Tablets
- Cameras
- Smart Board

Resources (Human, Web-based, Other)

- Internet
- Post Office
- Elrose Pharmacy

Project Plan

Activity	Notes	Time
Introductory Activity	- Students will be given a sample Fermi Math Challenge: "If you said the ABCs, continuously, for one day, how many times would you get through the whole alphabet?" - They will go through the basic process independently, and generate a wild guess, brainstorm to list other information they would need to answer this question, make an educated guess, and then list the steps they would follow (including calculations and estimations) to solve this challenge. - Then the students will write a reflection using the following stems: "I felt...", "I liked...", "I didn't like...", "I wish...", and "Next time..."	
The Challenge	Driving question, outline problem; expectations for project and presentation - Present the <i>Fermi Valentine's Day Challenge</i>. - Project overview	
"Need to Knows"	What skills will be needed to work through the project? Who are the "experts" that we can utilize? Brainstorm class needs with the students.	
"And We're Off!"	Groups formulate project plan – roles, responsibilities, and contributions. - Form groups - Allow time for planning	

Assessment Overview	1. Project rubrics 2. Reflection journal	
"Help!"	1. Use of cameras 2. Blogging 3. Field trip 4. Others	

Assessment Strategy

Assessment Results

Pre-Assessment	Post-Assessment

Project Evaluation – Personal Reflection

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Fermi Math Challenge

- ## 1. Question:

If you said the ABCs, continuously, for one day, how many times would you get through the whole alphabet.

2. Wild Guess: _____

3. What other information do you need to answer this question?

What do you need to research, measure, estimate, assume?

[illegible]

Now look closely at the questions. Will some of them be more helpful than others? Are there any you could eliminate?

4. Now that you have thought a little more, what is your educated guess? _____

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Fermi Math Valentine's Day Challenge

Commercially produced valentines were first produced in the 1840s. Today, over 140 million Valentine's Day cards are purchased each year. If you wanted to send a valentine card to each person in the world next year:

- How many boxes of valentines would you need to buy?
- How much would it cost for you to purchase and mail all of the cards?
- If everyone in the world sent a valentine to everyone else in the world, how many valentines in total would be sent?

Wild Guess:

Name	Boxes Needed	Total Cost	Total Sent

What Information Do We Need?

Educated Guess (as a group):

Boxes Needed	Total Cost	Total Sent

The Plan:

- How will the group answer the questions?
- How will you show your answer?
- How will you show your process?