Modeling with Linear Functions and Equations

What is this?

In this project, you'll create a guide to help organizations plan successful fundraising events by using linear functions to model relationships between costs, ticket sales, and other important factors.

Why am I doing it?

You're doing this to learn how using math, specifically linear modeling, can help you solve real-world problems and make smart decisions about money and planning.

What am I supposed to do?

Individually, you'll use equations, graphs, and tables to create a guide, and as a group, you'll combine your ideas to share your work with others.

Driving Question

How can we create a guide to help Raise and the organizations they support plan fundraising events by using math to predict costs, ticket sales, and net funds raised?

The driving question identifies the purpose, product, and audience.

Mission

Raise is a volunteer partnership that helps organizations plan fundraising events. Your team has been asked to create a guide to help Raise predict and compare event cost, ticket sales, and net funds raised using mathematical models.

To do this, you'll analyze key decisions like setting ticket prices, estimating attendance, and considering venue and meal costs - all while ensuring the event meets its financial goal.

Your guide will serve as a resource for Raise volunteers and the organizations they support to plan financially successful events.

Requirements for Individual Product

Each student is responsible for creating their own guide for Raise. However, you are encouraged and expected to collaborate, share ideas, and provide feedback to support each other throughout the process.

Create a **fundraising event planning guide** that includes:

- **A budget analysis** detailing ticket sales, event costs, and net profit.
- **A comparison of two pricing scenarios** that considers:
  - Different **venues** with different seating capacities.
  - Different **menu options** with different costs.
  - Different **fundraising goals** based on projected ticket sales.
- **Mathematical models (tables, graphs, and equations)** that:
  - Show how ticket pricing affects revenue and profit.
  - Compare total costs and net earnings for each pricing scenario.
  - Justify the recommended ticket price.
- **An explanation for Raise volunteers** that breaks down the math so they can confidently use the guide to plan future events.

Requirements for Team Product

- Work together to create a **unified presentation** based on your individual guides.
- Your presentation should include:
  - **Event details** (venue, menu, fundraising goal, and ticket pricing scenarios).
  - **Mathematical models** that justify your pricing recommendations.
  - **Supporting documents and visual displays** (tables, graphs, equations).
- Present your findings to Raise (or their representatives).
- Be prepared to explain your decisions and answer questions about how your model works.
- Adjust your recommendations if needed based on feedback.

Each project has an individual product and a group product.

The teams support the individuals throughout the sprints.

Badge

M102: Modeling with Linear Functions and Equations

Learning Goals

Modeling with linear functions helps you make smart financial

decisions by showing how ticket prices, costs, and revenue impact a fundraiser's success. By understanding key variables and constraints, you can predict outcomes, compare options, and make informed choices to reach financial goals—skills that apply to event planning, business, and beyond!

In this project, we will learn to

- Identify quantities important for modeling. (100.a)
- Use units in formulas, problems, and data displays to solve problems. (100.b)
- Solve one-variable linear equations and inequalities. (101.a)
- Solve two-variable linear equations and pairs of simultaneous linear equations. (101.c)
- Graphically represent and solve linear equations and inequalities. (101.d)
- Participate in the modeling process. (102.a)
- Interpret how linear functions and equations relate to real-world contexts. (102.b)
- Analyze linear functions using different representations. (102.c)
- Construct linear functions that depict relationships between quantities. (102.d)
- Solve linear equations and pairs of simultaneous linear equations to make conclusions. (102.e)
- Interpret expressions of linear functions based on the situation they model. (102.f)
- Create equations that describe linear relationships. (102.h)
- Understand the importance of modeling with linear functions. (102.i)
- Use a linear function model to find meaningful values in real-world problems. (102.j)

The team product is a culmination of the individ learning.

Each week, students identify when and how they have met the content expectations.

Content expectations are reinforced through the other activities (5mm, NOWS, Interrupters, ENDS) in the module.

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RAISE

Successfully facilitating exceptional fundraisers since 1996

456 Market Street,
Anytown, USA 12345

August 1, 2024

Scottsville High School
321 Green Way
Scottsville, KY 42164

Dear Math Team,

Thank you for agreeing to build a tool to help us plan meals for fundraising events. We are volunteers working for RAISE, an organization dedicated to helping other organizations raise funds. Unfortunately, some organizations have experienced situations where their expenses exceeded their receipts, resulting in financial losses. This often occurs because expenses are too high, ticket prices are too low, or both. We need your expertise to prevent this from happening.

We would like you to create a guide for us. The audience for this guide will include our volunteers and the leaders of the organizations we support. The guide should provide clear instructions on using mathematical models to make informed decisions. It should include examples, graphs, and diagrams to help visual thinkers understand the concepts.

Here are the key elements we want the tool to consider:

- Parameters to Set:
  - Desired profit
  - Realistic ticket prices for the chosen type of event
- Maximum and minimum number of guests
- Variables to Explore
  - Number of tickets sold
  - Menu options
  - Choice of event venue
- Cost Considerations:
  - Provide costs for at least two different menu options, including an entrée, dessert, and drink for each
  - Analyze how these costs will impact the overall profits

We also recognize that some community members may be curious or skeptical about the math involved. Please include a section in the guide that explains your functions and graphs in detail for these individuals.

We would appreciate a progress check-in next week to discuss the assumptions you are making regarding venues, meal costs, and the possible functions you are considering.

Thank you,
RAISE Volunteers

All screenshots and images courtesy of Desmos Graphing Calculator