MTH1W: Algebra in Real Life Project

Driving Question: How can we use equations and inequalities to model and explain real-life situations?

Mathematics is often used to represent real situations such as cost, distance, time, and limits. **Your task is to describe a real-life situation that can be modelled by an equation AND an inequality. You will explain the math behind the models, and present them visually.**

Project Overview:

- This project must be completed **individually**.
- Areas highlighted in yellow indicate sections you must complete.
- **Deliverables**:
    - This planning document, with all yellow sections filled in.
    - Visual poster or presentation
    - Project Reflection (to be completed after the project is over)
- The due date of this project is **Monday, March 23**.
    - On this day, you will present your project in a class gallery walk.

Step 1: Choose a Real-Life Scenario

Choose a situation where a relationship between quantities can be represented using **an equation and an inequality**. Your situation must involve **a variable**.

General Examples:

- *Cost of a taxi ride*
- *Phone plan / data usage*
- *Saving money for a purchase*
- *Speed and travel time*
- *Budget limits*
- *Ticket sales for an event*
- *Calories burned during exercise*
- *Earnings of a business*
- *Points needed to get an A*

Specific Example: I'm opening a bubble tea shop. It costs $80 to open the shop, and $2 for the ingredients to make one bubble tea. I am going to sell each bubble tea for $4.50. I will write an equation to find out how many teas I need to sell to break-even (make back the money I spent) and write an inequality to find out how many teas I need to sell until I make at least $100 in profit.

In 2+ sentences, write a description of your real-life scenario, and what you will calculate with your equation and inequality. Be specific!

I'm going to open a virtual cube shop. It costs $60 to permanently buy the domain and make the website. It costs about $20 to make the cube and package it. I am going to sell each cube for $45. I will write an equation to find out how many cubes I need to sell to break even and write an inequality to find out how many cubes I need to sell until I make at least $100 back in profit.

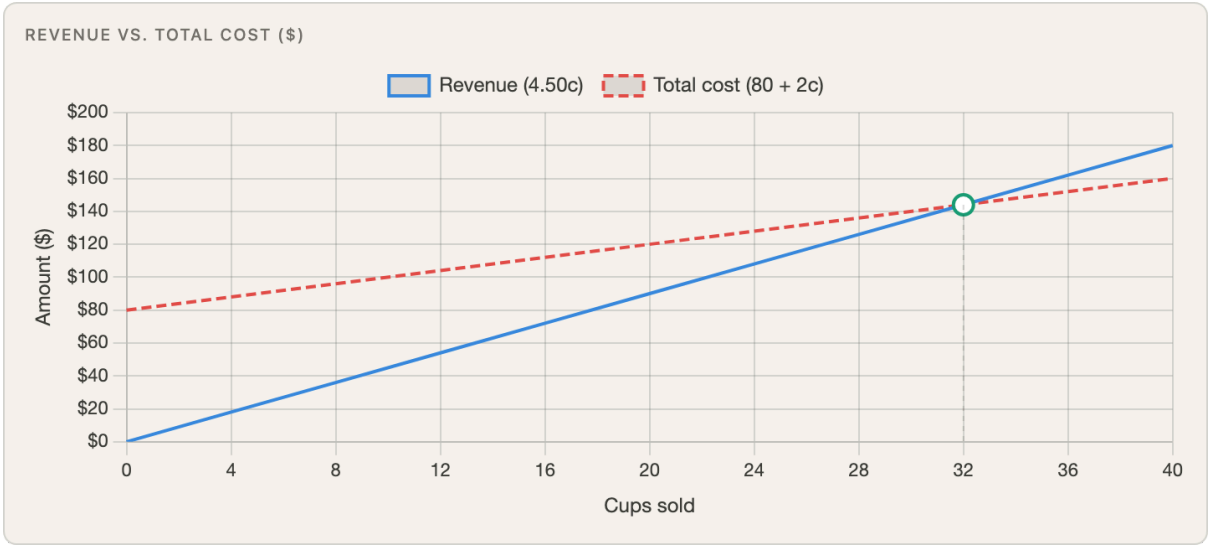
Step 2: Write Your Equation

Clearly explain what each variable, coefficient, and constant represents.
Write and simplify your equation.
Solve your equation.
Create a visual representation of your equation (table of values or graph).

- If you want to create a table, use the table function or Google Sheets.
- If you want to create a graph, use Desmos or Google Sheets (requires you to input a table of values first).

Example:

- *c is number of bubble teas sold*
- *80 is cost to open the shop*
- *2 is ingredient cost per tea*
- *4.5 is selling price per tea*
- *The break-even point is when revenue (money earned) = cost*
- *Equation: 80 + 2c = 4.5c → c = 32 teas*



Define each variable, coefficient, and constant:

- x is the number of cubes
- 60 is the cost to set up shop

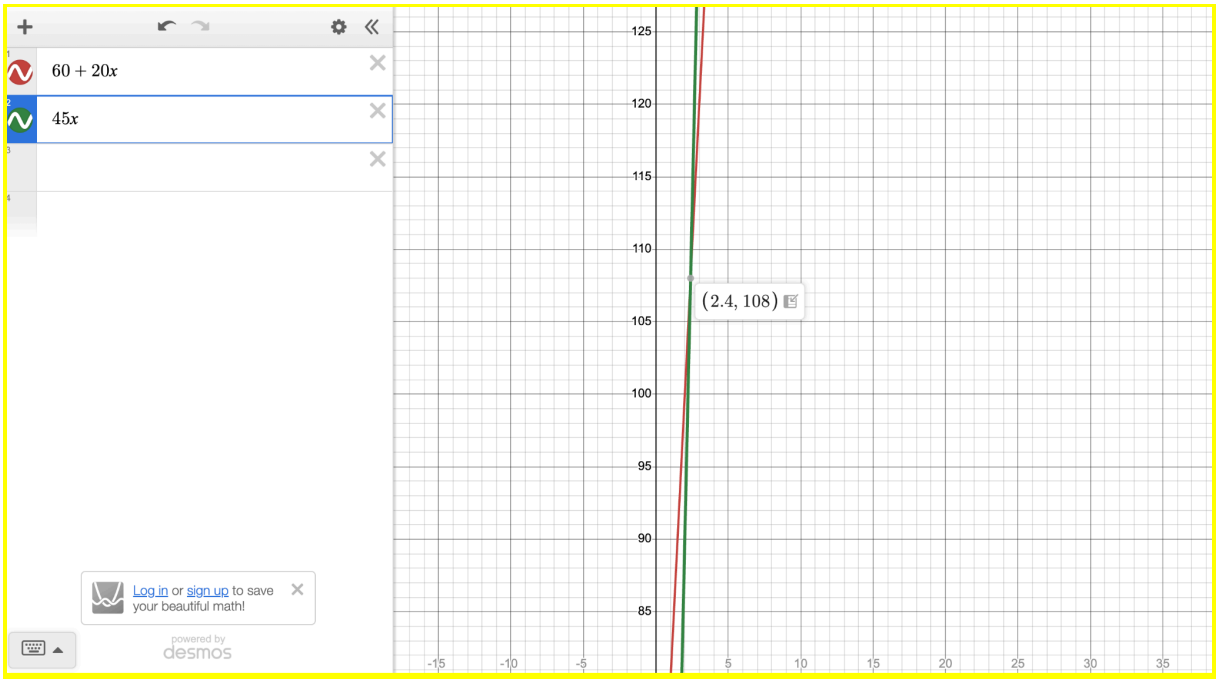
- 20 is the cost to manufacture per cube
- 45 is the selling price per cube
- The break-even point is when revenue (money earned) = cost

Write your equation: 60 + 20x = 45x

Simplify if necessary: 60 = 25x

Solve your equation (show your work!): 60/25 = 2.4 so i need to sell 3 cubes to earn back my cash.

Include a visual model (table or graph):



Step 3: Write Your Inequality

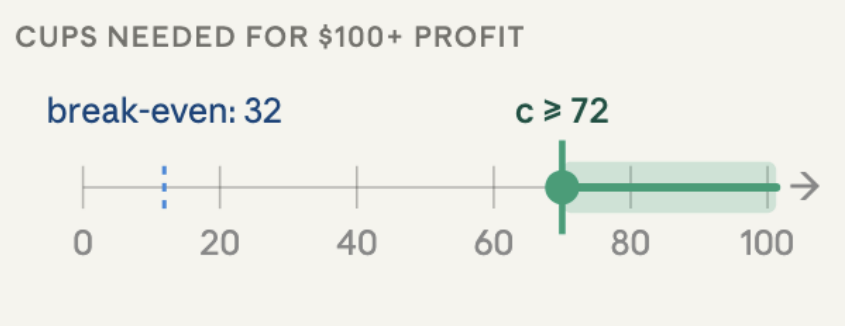
Clearly explain what each variable, coefficient, and constant represents.
Write and simplify your inequality.

Solve your inequality.
Create a visual representation of your inequality (number line).

- You may use the Desmos Number Line Maker to make your number line, or draw it by hand on Canva or any other software.

Example:

- *c is number of bubble teas sold*
- *80 is cost to open the shop*
- *2 is ingredient cost per tea*
- *4.5 is selling price per tea*
- *100 is the minimum profit goal*
- *Inequality: 4.5c − (80 + 2c) ≥ 100 → c ≥ 72 cups*



Define each variable, coefficient, and constant:

- x is the number of cubes
- 60 is the cost to set up shop
- 20 is the cost to manufacture per cube
- 45 is the selling price per cube

1. **Write your inequality:** 45c - (60 + 20c) ≥ 100

Simplify if necessary: _____

Solve your inequality (show your work!): _____

Include a visual model (number line):

Step 4: Interpret Your Models

Using words, explain your results from Step 2 and Step 3.

Example: Solving my equation showed that I need to sell 32 cups of bubble tea to make back the costs I spent to open the shop and make the bubble teas. Solving my inequality showed that to make at least $100 in profit, I need to sell 72 cups of bubble tea.

Answer:

Solving my equation showed me that I need to sell 3 cubes to make back the costs I spent to open the shop and make the bubble teas. Solving my inequality showed that to make at least $100 in profit, I need to sell 7 cubes.

Step 5: Visual Representation

Create a **visual poster or presentation** that explains your scenario and models.

Your visual should include:

- Title of your project, related to your scenario
- Description of your scenario
- Your equation, with all steps shown and variables defined
- Your inequality, with all steps shown and variables defined
- Visual models of your equation (graph or table) and your inequality (number line)
- Interpretation of your results