

AI and Story Problems

Why?

This lesson plan introduces AI as a modern tool to enhance math education, specifically in developing and solving story problems. It leverages generative AI's capabilities to create engaging, context-rich math problems, fostering critical thinking and real-world application skills among students. This integration showcases the intersection of technology and education, preparing students for a tech-savvy future.

Materials Needed

- Computers or tablets with internet access
- Access to AI text generator (links at end of document)
- Printouts of AI-generated story problems (optional)

Time needed

Approximately 30 minutes

Objectives

- Students will be able to interact with an AI tool (such as ChatGPT) to generate math story problems.
- Students will be able to use their problem-solving skills by tackling unique, AI-created scenarios.
- Students will be able to critically assess and revise AI-generated content for clarity and relevance.

Lesson

1. **Introduction to AI text generator:** Briefly explain AI and introduce AI text generator, focusing on its ability to create story problems.
 - a. Illustrate the process of creating story-based problems for whatever process currently being studied in the class. (See examples at the end of the lesson.)
 - b. Warn students that AI text generators do not necessarily have a perfect understanding of mathematical facts, so they may struggle at times to create solvable problems.
 - c. There are several different ways to respond if the AI text generator provides a problem that does not fit with the task requested:
 - i. Keep prompting it to revise problems until it comes up with one using the requested skills
 - ii. Ask students to analyze the problem to try to understand what it is actually asking
2. **Generating Story Problems:** Divide students into pairs or small groups. Each group interacts with an AI chatbot to request math story problems relevant to

their current topic of study.

3. **Suggestions:**

- a. Ask the AI to write a story in a particular setting or genre that is interesting to students. (such as medieval, sci-fi, etc.)
- b. If the problems are too easy or too difficult, prompt the AI with a request to modify. (For example, "The story problem is too complicated. Make it a bit simpler.")
- c. Request the story problems unsolved. That way students will be able to do the math themselves.
- d. Request the story problems without the mathematical equations included. That way students will get practice extracting relevant information.

4. **Solving Problems**

- a. Students print out the stories, or share with each other in documents, or project them in the classroom.
- b. Students work on the problems individually or in groups, writing out their solutions.

Discussion Questions

- How did the AI-generated story problems compare to traditional problems?
- What are the benefits and limitations of using AI to create math problems?
- Discuss any unexpected or unusual problems generated by AI and how they were tackled.

Supplemental Activity Ideas

- **Graphing AI Data:** Generate a series of AI-created data sets for different mathematical scenarios (e.g., sales over time, temperature changes). Students can graph these data sets, interpret trends, and make predictions.
- **Cross-Subject Integration:** Use generative AI to generate story problems that incorporate elements of history, science, or literature, encouraging interdisciplinary learning.

Sources to Learn More

IA Chatbots to try for this assignment

- ChatGPT: chat.openai.com
- Anthropic Claude: claude.ai/
- Google Bard: bard.google.com/chat
- Microsoft Bing Chat: www.bing.com/chat

Example 1 - ChatGPT

User: Create a short story that includes two mathematical story problems to solve. The problems should include using the distributive property. The problems should be at the 7th grade level.

ChatGPT: Once in the small town of Maplewood, there was a buzz of excitement as the annual school carnival approached. Among the many students eagerly preparing for the event was Emily, a seventh-grader known for her quick thinking and love for mathematics.

This year, the school had introduced a challenge: "The Great Booth Bonanza". Each class was tasked with setting up a booth with games or food, and the class that raised the most money would win a grand prize – a field trip to the newly opened Adventure Science Center.

Emily's class decided to set up a cookie and lemonade stand. They planned to sell homemade cookies and fresh lemonade. However, to make the plan a success, they needed to calculate their costs carefully.

Problem 1: Calculating Cookie Costs

The class agreed to make two types of cookies – chocolate chip and oatmeal raisin. For every batch of chocolate chip cookies, they needed 4 cups of flour and 2 cups of sugar. For oatmeal raisin cookies, they needed 3 cups of flour and 2 cups of sugar. They decided to make 6 batches of each type.

Emily thought, "I can use the distributive property to calculate the total cups of flour and sugar we need."

Task for Students:

Using the distributive property, calculate the total cups of flour and sugar needed for all the cookie batches.

{ChatGPT struggled to provide a second scenario that actually used the distributive property. With continued prompting, though, it came up with this scenario}

Problem 2: Maximizing Party Supplies within a Budget

Emily's class had a budget of \$75 for party supplies for their carnival booth. The store offered a special deal on party packs: each pack, containing 15 paper plates and 20 plastic cups, cost \$10. Emily needed to calculate how many plates and cups they could get without exceeding their budget.

Task for Students:

Determine how many paper plates and plastic cups the class can get with a \$75 budget.

Example 2 - Bard

User: Write a creative short story set in medieval times that includes two mathematical story problems to solve. The problems should include using literal equations, containing two or more variables. The problems should be at the 9th grade, Algebra 1 level. Do not solve the problems -- present them in the story unsolved.

Google Bard: In the heart of the Middle Ages, amidst the towering castles and bustling marketplaces, there lived a young blacksmith named Eamon, renowned for his craftsmanship and quick wit. As the sun cast its golden rays upon the cobblestone streets, Eamon stood beneath the shade of his blacksmith's awning, his hammer striking the anvil with rhythmic precision.

One morning, a peculiar request arrived at Eamon's doorstep. A wealthy merchant from a neighboring kingdom sought his expertise in crafting a unique set of armor for his daughter, Princess Gwendolyn. The armor, he explained, was to be not only protective but also aesthetically pleasing, showcasing the princess's valor and elegance.

Eamon, intrigued by the challenge, accepted the commission, his mind already buzzing with creative designs. He knew that crafting such a masterpiece would require careful planning and precise calculations.

As he delved into the project, Eamon encountered two mathematical conundrums that threatened to hinder his progress:

1. The merchant had specified that the armor should have a weight of no more than 30 pounds. Eamon knew that the steel he intended to use weighed 4 pounds per square foot, and the leather trim weighed 1 pound per square foot. Let x represent the area of steel used and y represent the area of leather trim. How could Eamon express the total weight of the armor in terms of x and y ?
2. The merchant also requested that the helmet be designed with a visor that could be adjusted to fit the princess's head circumference. The visor was to be shaped like a trapezoid, with a top width of 12 inches, a bottom width of 18 inches, and a height of 6 inches. How could Eamon determine the area of the visor using a single variable?

Eamon knew that solving these mathematical riddles was crucial to completing the armor and fulfilling the merchant's demands. With a determined glint in his eyes, he set aside his hammer and picked up a quill and parchment, ready to unravel the mysteries that lay before him.