Life on the Campaign Trail

Systems of Equations

Amber Stokes, Brittany VanCleave, Mariah Warren, Mariah Warren
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Subject	Mathematics	**Time Frame**	3-4 class period(s)
Course	Algebra 1	**Duration**	180 minutes

Essential Question

How can we use systems of equations to solve real-world problems? Objectives: Students will be able to use investigation to determine the variables that influence the success of a campaign, use various methods to solve systems of equations involving campaigns (e.g., graphing, substitution, and elimination), and formulate a connection between the use of math and the duties of campaign managers, as well as other career paths that require a similar skill set.

Summary

This lesson will teach students about solving systems of linear equations by focusing on variables that play a role in political campaign management. Students will experience the connection between algebra and careers through a virtual “Career Zoom” interview with a campaign manager, then create their own campaign plan for their own candidacy or a partner's. This lesson includes optional modifications for distance learning. Resources for use in Google Classroom are included.

Snapshot

Engage

Students use the Zoom web application to interview a political campaign manager and discuss different aspects of the job, including budgeting for the candidate’s campaign.

Explore

Students research the variables that contribute to building a successful campaign.

Explain

As a class, students discuss and identify the variables that are most influential in building a successful campaign. Students create equations based on their research regarding the average costs of ads and community forums. Students use graphing, substitution, and elimination to solve and discuss the systems of equations they created.

Extend

Students create a campaign plan promoting a candidate for a school election.

Evaluate

Students present their campaign materials to a partner classroom via Zoom. The partner classroom votes to elect the candidate who has the most effective campaign.

Standards

Oklahoma Academic Standards for Mathematics (Grades 9, 10, 11, 12)

A1.A.1.3: Analyze and solve real-world and mathematical problems involving systems of linear equations with a maximum of two variables by graphing (may include graphing calculator or other appropriate technology), substitution, and elimination. Interpret the solutions in the original context.

Attachments

- Campaign Research Organizer Handout—Life on the Campaign Trail - Spanish.docx
- Campaign Research Organizer Handout—Life on the Campaign Trail - Spanish.pdf
- Campaign Research Organizer Handout—Life on the Campaign Trail.docx
- Campaign Research Organizer Handout—Life on the Campaign Trail.pdf
- Campaign Rubric Handout—Life on the Campaign Trail - Spanish.docx
- Campaign Rubric Handout—Life on the Campaign Trail - Spanish.pdf
- Campaign Rubric Handout—Life on the Campaign Trail.docx
- Campaign Rubric Handout—Life on the Campaign Trail.pdf
- Career Zoom Handout—Life on the Campaign Trail - Spanish.docx
- Career Zoom Handout—Life on the Campaign Trail - Spanish.pdf
- Career Zoom Handout—Life on the Campaign Trail.docx
- Career Zoom Handout—Life on the Campaign Trail.pdf
- KWL Chart—Life on the Campaign Trail - Spanish.docx
- KWL Chart—Life on the Campaign Trail - Spanish.pdf
- KWL Chart—Life on the Campaign Trail.docx
- KWL Chart—Life on the Campaign Trail.pdf
- Lesson Slides—Life on the Campaign Trail.pptx

Materials

- Lesson Slides (attached)
- Student devices with internet access
- Career Zoom handout (attached, one per student)
- Campaign Research Organizer handout (attached, one per student)
- Campaign Rubric handout (attached, one per pair of students)
- KWL Chart (attached, one per student)

Engage

Use the attached **Lesson Slides** to guide the lesson. Begin with the lesson title and essential question on **slide 1**, then the lesson objectives on **slide 2**. Distribute a copy of the attached KWL Chart to each student. Transition to **slide 3** and introduce students to a modified KWHL Graphic Organizer strategy to activate prior knowledge about the duties of a campaign manager. Ask students to complete the K and W columns by answering the questions on the slide: *What do you KNOW about a campaign manager? What do you WANT to know about a campaign manager?* (The L column will be completed after the Zoom call or video.)

Teacher's Note: Interview Questions

To prepare for this activity, ask a professional campaign manager you've identified in advance to speak with the class. As the meeting is held over Zoom, you are not limited to your local political scene—consider searching online for a campaign manager you feel would fit your classroom. Additionally, inform students beforehand, ideally in the prior class meeting, that the class has invited a professional campaign manager into the classroom for a virtual interview. This way, students have time to come up with their own questions or edit questions they came up with during the KWL Chart activity. Additionally, a list of guiding questions can be found below.

Teacher's Note: Using Zoom

The following activity allows students to conduct a virtual interview with a campaign manager using Zoom, a free web-based teleconferencing tool. If you're unfamiliar with Zoom, reference the Zoom User Guide. If you prefer not to engage in this activity with a campaign manager, you may optionally use the How to Run a Smart Campaign video linked on slide five.

Pass out the attached **Career Zoom** handout and move to to **slide 4** to begin the Zoom meeting. Ask students to record details from the interview on their handouts. Once ready, Zoom into the meeting with the campaign manager. Allow the campaign manager to introduce themselves, inform students about the educational background required for the career, and explain their job. When the campaign manager is finished providing some background, allow students to pose their prepared questions. If necessary, guide the conversation towards learning the key components of a campaign manager's job and what factors are important for success in a political campaign. Below are example questions for this purpose:

- What do you do as a campaign manager?
- How are math skills incorporated in your day-to-day job description?
- What education is needed in order to be successful in your role?
- What key components go into a successful campaign?

Optional Alternative: How To Run A Smart Campaign

If you prefer not to engage in the above Zoom interview with a campaign manager, you can instead use the How to Run a Smart Campaign video linked here and on **slide 5**.

Go to **slide 6**. After the Zoom call or watching the "How to Run a Smart Campaign" video, invite students to complete the **L** portion of their KWL charts. Lead a class discussion over the key details that students learned.

Explore

Go to **slide 7**. Distribute the attached **Campaign Research Organizer Handout.** Have students research the important components of a successful political campaign based on the information provided by the campaign manager. Ask students to research why each component is important to the campaign, the average cost of each component, how other candidates have used each component, whether each component should be performed digitally, physically, or both, and any other relevant factors.

Teacher's Note: Learner Exploration

Have students record their findings on the graphic organizer provided. In the Campaign Research Organizer Handout, students can see examples of each of the components listed above. Allow students to openly explore components that interest them, but have them keep in mind and focus on the components that contribute to a *successful* campaign.

Explain

Go to **slide 8**. Using the Inverted Pyramid strategy, ask students to pair up and discuss their research findings. Students should discuss what their ideas have in common, what is different, and what components are important to a successful campaign, among other things. After a few minutes of discussion time, have each pair join up with another pair to discuss further. For the final round of discussion, bring the whole class together. As a class, pick out 3–4 components that groups have agreed on and that can be represented virtually and physically in a campaign. These components will be used later to create a system of equations.

Optional Modification For Distance Learning

For online or distance learning, consider making this activity a discussion board post to which your students can respond directly, using a platform such as Google Docs, Google Classroom, or Canvas. Download all attachments to use this lesson in Google Classroom.

At this stage, students should begin to understand the connections between campaign components. Have students choose both virtual and physical components to build a campaign budget. Give students an arbitrary maximum amount they can spend on the campaign. Have a conversation about how their campaign components will be represented as two different variables in an equation. For example, the x-variable represents advertising (e.g., billboard, newspaper, social media, etc.), and the y-variable represents community forums (e.g., TV interviews, town hall meetings, YouTube speeches, etc.). Once the variables are established, ask students to create two equations: a first equation to represent the virtual components of the campaign, and a second equation to represent the physical components of the campaign. Move to **slide 9** to show an outline of how the components and equations should be organized. Display this slide for the students as they create their equations.

Teacher's Note: Using Flip

Flip is an online community classroom that allows students to post videos in response to prompts. Flip is free, but requires you to set up your class beforehand. Once your virtual classroom is created, students may join by following a link that you share with them. Next, add a topic, share a link to the topic, and invite students to post a video with their responses. Students will be able to view each other's posted videos.

Go to **slide 10**. Have students use the Flipgrid you created to explain what components they researched and how they created their equations. Next, ask each student to watch two additional videos from their peers to compare their equation with their peers' equation. This will give students the opportunity to brainstorm how to use these equations to solve problems.

Foster a discussion centered on students' reflections on the Flipgrid activity. Then, introduce three different ways to solve an equation: substitution, elimination, and graphing. Ask students to collectively determine the best way to solve for different variables. Begin by showing **slide 11**, which includes examples of solving systems using each of the three methods mentioned above. The following three slides contain challenge questions to demonstrate each method.

Teacher's Note: Solving Systems

Use **slide 12** for a graphing example, **slide 13** for a substitution example, and **slides 14 and 15** for elimination examples. The challenge problems in the slide presentation use smaller numbers not related to the campaign and are intended to check understanding before going back to the campaign trail.

Optional Modification For Distance Learning

To make these concepts accessible for students in an online or distance learning environment, you might consider recording your voice as you walk through the examples of solving systems on **slides 11-15**. You can do this using a video conferencing tool such as Zoom. Open the lesson slides in PowerPoint, select the PowerPoint when you share your screen in the app, and record the call as you discuss slides 11 through 15. Then, share your video with students. Download all attachments to use this lesson in Google Classroom.

Extend

Go to **slide 17**. Now, invite students to play the role of a campaign manager for their own school election. Have students partner up and create their own campaign plan to promote themselves or their partner as a candidate. The campaign plan should include equations and variables to fit an election in their school. As a whole class, ask students to determine how much money should be allocated, which variables they will be using, and the cost of each variable. For example, variables could include a video speech, a social media ad, a podcast interview, a Canva brochure, a blog, posters, etc. Students should ensure there are enough variables to create both a physical and a virtual equation, as they did previously.

Have students create a presentation that can be shared digitally with another classroom. Presentations can be formatted as Google Slides, a Google Site, a Prezi, or any shareable format they are comfortable using.

Teacher's Note: Using The Campaign Rubric Handout

Distribute the attached **Campaign Rubric Handout** to each pair of students to serve as a guideline for this project. This will serve as a guide to evaluate how well students have fulfilled various aspects of the campaign plan.

Evaluate

Teacher's Note: Selecting A Partner Classroom

Select a partner classroom in your school, or at another school, to exchange campaign plans. You may use Zoom again in this portion of the lesson to connect with the other classroom. Zoom has a desktop sharing capability, enabling students to project their presentations to another classroom. With two Zoom presentations per classroom to coordinate, decide your schedule in advance with your partner classroom. Your classroom will give two Zoom presentations: one to "launch" students' planned campaigns, and another Zoom presentation to hold a debate between your classroom's candidates. Between Zoom presentations, allow your partner classroom enough time to discuss the campaign strategies and materials you have shared. Your partner classroom, in turn, should hold two of its own Zoom presentations to share campaign strategies and to hold a debate. After these presentations, each class should vote on a candidate from the other class. This order is not strict and can be adjusted based on the needs of each classroom.

Optional: Alternative Lesson Approaches

If you are unable or would prefer not to coordinate with a partner classroom to do the full version of this lesson together, consider asking another classroom to participate as observers to your students' presentations, and then having them vote on a winner. If you are unable to coordinate with a partner classroom, presentations can be given in the classroom only.

Move to **slide 18.** Invite each pair of students to launch their campaign with the materials they've created. Use Zoom to connect with your partner classroom and invite each team to present their campaign strategy and materials. Depending on your classroom needs, you may want every group to present, or you may have only certain groups present. In turn, be sure to watch your partner classroom's presentations. After watching your partner classroom's presentations, discuss the campaign strategies and materials used.

Teacher's Note: Preparing Ballots

Create a Google Form in advance for students to vote for the candidate of their choice. Add each candidate to the form and set the form to allow the selection of only one candidate per vote. Share with students at the end of the final rally.

After discussion, hold a final rally via Zoom in which your classroom's candidates debate against other candidates in the classroom, answer questions their "constituents" may have, listen to feedback on how they spent their money based on their systems of equations, and reflect on the experience as a whole. View your partner classroom's debate, as well. At the conclusion of the rally, ask your partner class to vote for their choice of the best candidate from your classroom and vice versa. After voting is complete, share the results with your partner class.

Resources

- Forms. (n.d.). https://www.google.com/forms/about/
- K20 Center. (n.d.). Flip. Tech Tools. https://learn.k20center.ou.edu/tech-tool/1075
- K20 Center. (n.d.). Google Classroom. Tech Tools. https://learn.k20center.ou.edu/tech-tool/628
- K20 Center. (n.d.). Inverted Pyramid. Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f507a918
- K20 Center. (n.d.). KWHL Graphic Organizer. Strategies. https://learn.k20center.ou.edu/strategy/d9908066f654727934df7bf4f505dd47
- Stanford. (2016, October 14). How to run a smart campaign [Video]. https://www.youtube.com/watch?v=zbGzJ5gTm5E
- Zoom User Guide. https://www.nl.edu/media/nlu/downloadable/lits/zoom-userguide.pdf