

Going Viral

Solving Equations

Mariah Warren
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Grade Level	7th Grade	**Time Frame**	2 class periods
Subject	Mathematics	**Duration**	90–105 minutes
Course	Middle School Mathematics		

Essential Question

How can you write and solve equations?

Summary

This lesson focuses on teaching students how to solve algebraic equations using student-friendly language. Students will begin by trying to solve viral math posts in groups. Next, they will learn the "Do/Undo" method for solving equations. Finally, students will create their own viral math posts and solve their classmates' equations.

Snapshot

Engage

Students select from four options to determine which image is not like the others and justify their thinking, trying to convince their peers.

Explore

In groups of six, students form strategies for solving viral math posts and peer-review their group mates' answers.

Explain

Students learn how to solve two-step equations using the “Do/Undo” method.

Extend

Students generate their own algebraic equations and display them as viral math posts.

Evaluate

Students view and solve other student’s viral posts using the Gallery Walk strategy.

Standards

ACT College and Career Readiness Standards - Mathematics (6-12)

AF301: Solve routine one-step arithmetic problems using positive rational numbers, such as single-step percent
AF302: Solve some routine two-step arithmetic problems
A302: Solve one-step equations to get integer or decimal answers

Oklahoma Academic Standards Mathematics (7th Grade)

7.A.3.1: Write and solve problems leading to linear equations with one variable in the form px + q = r and p(x + q) = r, where p, q, and r are rational numbers.

Attachments

- Coins Posters—Going Viral.docx
- Coins Posters—Going Viral.pdf
- Create Your Own—Going Viral - Spanish.docx
- Create Your Own—Going Viral - Spanish.pdf
- Create Your Own—Going Viral.docx
- Create Your Own—Going Viral.pdf
- Guided Notes—Going Viral - Spanish.docx
- Guided Notes—Going Viral - Spanish.pdf
- Guided Notes—Going Viral.docx
- Guided Notes—Going Viral.pdf
- Lesson Slides—Going Viral.pptx
- Pass the Problem—Going Viral - Spanish.docx
- Pass the Problem—Going Viral - Spanish.pdf
- Pass the Problem—Going Viral.docx
- Pass the Problem—Going Viral.pdf
- Sample Problems—Going Viral - Spanish.docx
- Sample Problems—Going Viral - Spanish.pdf
- Sample Problems—Going Viral.docx
- Sample Problems—Going Viral.pdf

Materials

- Lesson Slides (attached)
- Coins Posters (attached, one set; print front only)
- Pass the Problem handout (attached, one set per group; print front only)
- Guided Notes handout (attached, one per student; print front only)
- Create Your Own handout (attached, one per student; print front only)
- Sample Problems handout (attached, optional, one per student)
- Pencils/pens
- Paper
- Student devices with internet access or the following materials:
- Sticky easel pad paper
- Coloring utensils (markers, colored pencils)

5 minutes

Engage

Teacher's Note: Preparation

Prior to beginning the lesson, print out the attached **Coins Posters** and hang them in four corners of your classroom. (This activity was inspired by Andrew Gael's work from "Which One Doesn't Belong?") If you prefer, use a different or an additional set of shapes from this source for the activity. The goal is to encourage students to justify their thinking.

Introduce the lesson using the attached **Lesson Slides**. Show **slide 3**, which displays the lesson's essential question: *How can you solve and write equations?* Move to **slide 4**, which identifies the lesson's learning objectives. Review each of these with your class to the extent you feel necessary.

Display **slide 5** and introduce the Not Like the Others strategy. Ask students to identify which image does not match the others. Have them explain why. After a minute of wait time, direct students to move to the poster to indicate which image is not like the others. Invite each group to discuss amongst themselves how to convince others to join their group. Allow 1–2 minutes for this discussion, then have each corner select a spokesperson to share their reasoning. Allow others to change corners.

Sample Student Responses

Since there is not a right or wrong answer to explain why one image is not like the others, students may have a lot of variety in their rationales. For example:

- The pennies are the only non-silver coins.
- The quarter is the only single coin.
- The nickels are the only coins that are heads-up.
- The dimes are the only coins that have a value that is a multiple of eight.

Optional Modification for Distance Learning

To adapt this activity for online or distance learning, consider having students select the image they feel does not match the others and to justify their reasoning using a discussion board in your LMS or with a tech tool like Padlet. Download all attachments to use this lesson in Google Classroom.

20 minutes

Explore

Show **slide 6** and introduce the Pass the Problem strategy. Ask students to find a partner or assign partners. Then, have pairs create groups of three pairs. Give each group a copy of the **Pass the Problem** handout, one page per pair. Each page has a set of problems—about food, animals, and space—that will circulate within the group. Direct pairs to solve only the first equation (Round 1) on the handout. Allow them 2–3 minutes to complete this task.

Teacher's Note: Timing The Rotations

Based on your students' abilities, feel free to adjust the timing of the rotations in the Pass the Problem activity.

When time is up, move to **slide 7** and direct students to pass their handout to another pair in their group. This new pair should check the first pair's work from Round 1. They should make any necessary corrections and then solve the equation on the second line (Round 2). Give students 3–4 minutes to complete this round.

When time is up for the second round, display **slide 8** and direct pairs to pass the handout to the pair that has not yet worked on that problem. Ask this pair to check the first and second pairs' work from Rounds 1 and 2, make any necessary corrections, and then solve the equation on the third line (Round 3). Give students 4–5 minutes for this round.

Display **slide 9** and ask students to return the handout to the original pair who started it. The original pair should check all the work on the handout and solve the final line (Round 4).

After the groups have completed the activity, transition through **slides 10–12** to review their work for each round of each problem set.

Optional Modification for Distance Learning

To use this activity in an online or distance learning environment, consider asking students to individually solve one full set of problems. Use a tool like Padlet to have students upload a picture of their work, then ask other students to check their work and add comments to their posts. Download all attachments to use this lesson in Google Classroom.

30 minutes

Explain

Give each student a copy of the attached **Guided Notes** handout. Then transition through **slides 13–19** to demonstrate how to solve a two-step equation using a "Do/Undo" table. Each slide shows the next step of the “Do/Undo” technique. As you move through the example, have students follow along by taking notes on their handout.

Teacher's Note: Solving Equations with Undo Tables

The table is organized with the “Do” column on the left and the “Undo” column on the right. The purpose of the left column is for students to use the order of operations to write what operations are involved on the side of the equation containing the variable. The right column is where students undo those operations to isolate the variable.

1. Begin by writing an equation, introducing a variable, then combining like terms.
2. Write that variable in the first row of the table.
3. List as steps what is happening to the variable, using the order of operations. In the given example, $4x + 5 = 25$, x is first multiplied by 4, then increased by 5.
4. Write the numerical value (on the other side of the equals sign) in the last row, which is “= 25.”
5. Mirror the bottom-most value (25, in the above example) by copying it to the bottom row of the Undo column.
6. Working from the bottom to the top in the right column, write the operations opposite to the ones in the left column. In the given example, – 5 is the opposite of + 5, and ÷ 4 is the opposite of · 4.
7. Using the bottom-most number, perform each operation, working up. Write your final number on the top row, mirroring the variable.

To check your answer, plug it into the variable in the left column and perform each operation, from top to bottom. If it then equals the number on the last row of the left column, you have confirmed the answer is correct.

Check out “Solving Equations with Undo Tables” for additional support on how to use this method of solving.

Move to **slide 20** and direct students’ attention to the second example on their handout. Ask the class if they can think of a way to answer the question with the given information. Ask guiding questions as needed to help students see that they will need to find the value of each icon—laptop, phone, earbuds, and headphones—so they should use the “Do/Undo” tables they just learned about.

Use **slides 21–28** to focus students’ attention. Slide 21 contains the first equation from their handout, while the hidden slide 22 shows the method for solving the equation. Each pair of slides follows this pattern. You may choose to unhide slides 22, 24, 26, and 28 to go over the problems. Be sure to introduce the terms *coefficient*, *constant*, and *variable* as you work these problems with the students.

Use **slide 29** to review the final result.

Teacher's Note: Guiding the Lesson

As you finish this second example and find the value of each icon, consider facilitating a brief conversation about the importance of context. For example, you found that the value of the laptop icon is 8, but there are no units because there is no context. Is the laptop 8 pounds, 8 dollars, etc.? Explain that sometimes context does not matter in equations, especially when just practicing math skills, but in the real world, we should always know the units used.

15 minutes

Extend

Teacher's Note: Activity Preparation

During this portion of the lesson, students will create their own viral math post. Later, they will solve each other's viral posts. To save time, students are going to create their equations digitally so as to not spend too much time creating detailed illustrations. Decide before beginning this activity if you prefer students to digitally create their viral posts or use pencil and chart paper. Consider the needs of your students and classroom setup to make the best decision, as both options are effective.

If you prefer a digital creation, consider how students will share their creations. Google Slides is a good option: create a blank slide deck with enough empty slides for each creation to be on its own slide and share the link with the class. Canva is also another great option for this activity and functions similarly. Both tools allow students to quickly add icons or more detailed graphics to their slides. Use a tool that your students are familiar with to minimize time spent learning the tool. Try to use a tool that your students are familiar with; this will help reduce the time students need to learn the tool.

Show **slide 30.** Give each student a copy of the attached **Create Your Own** handout and invite students to generate their own equations to display as a viral math post, similar to the ones they solved during the Explore phase of the lesson. Use the slide to explain the task:

- Use at least three variables (e.g., pictures, emojis, etc.).
- Write at least four lines in their viral math post.
- Create an answer key for their problem.

Teacher's Note: Guiding The Activity

Check students' work during the rough drafts to ensure they are creating posts that are challenging but solvable.

Show **slide 31** while students plan their creations. Once students have completed Part 3 of their handout (their key), direct them to where you would like them to share their post: share the link for the slide deck or give students poster paper and coloring utensils. Use the hidden **slide 32** as an example of student work.

20 minutes

Evaluate

Display **slide 33** and have students get out notebook paper. Use the Gallery Walk strategy so that students can share their viral posts and solve others' posts. Have students solve the math posts of five other students, recording their work on their paper. After students have solved five posts, ask each student to share the answer of their last line (final result) so that everyone can check their work. If needed, have students share their entire answer key for their viral math post.

Use students' work as a formative assessment to determine if they need additional practice or are ready for the next topic. If students need a little extra practice, use the attached **Sample Problems** as you see fit.

Resources

- K20 Center. (n.d.). Canva. Tech Tools. https://learn.k20center.ou.edu/tech-tool/612
- K20 Center. (n.d.). Gallery walk/Carousel. Strategies. https://learn.k20center.ou.edu/strategy/118
- K20 Center. (n.d.). Google classroom. Tech Tools. https://learn.k20center.ou.edu/tech-tool/628
- K20 Center. (n.d.). Google slides. Tech Tools. https://learn.k20center.ou.edu/tech-tool/2335
- K20 Center. (n.d.). Not like the others. Strategies. https://learn.k20center.ou.edu/strategy/77
- K20 Center. (n.d.). Padlet. Tech Tools. https://learn.k20center.ou.edu/tech-tool/1077
- K20 Center. (n.d.). Pass the problem. Strategies. https://learn.k20center.ou.edu/strategy/151
- Ohashi, R. [numberninja]. (2013, October 19). *Solving equations with undo tables* [Video]. YouTube. https://www.youtube.com/watch?v=aOnHNP-giYQ