

Pie > Everything, Part 1

One-Step Inequalities

Brittany VanCleave, Amber Stokes
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Grade Level	7th Grade	**Time Frame**	2 class periods
Subject	Mathematics	**Duration**	80–90 minutes
Course	Middle School Mathematics		

Essential Question

How can we use inequalities to represent relationships?

Summary

In this lesson, students explore the relationship between a set of numbers and the constraints of an inequality. They will write, graph, and identify solutions to inequalities and connect these to real-world scenarios when applicable.

Snapshot

Engage

Students match scenarios with inequalities in a Card Matching activity.

Explore

Students investigate solutions to inequalities using a T-chart and number lines.

Explain

Students discuss their solution methods and clarify misconceptions about solving inequalities.

Extend

Students match scenarios with inequalities and find corresponding algebraic and graphical solutions.

Evaluate

Students demonstrate understanding by identifying and correcting a mistake in a solved inequality.

Standards

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

A405: Match simple inequalities with their graphs on the number line (e.g., x ≥ –3/5)
A503: Solve first-degree inequalities when the method does not involve reversing the inequality sign

Oklahoma Academic Standards Mathematics (7th Grade)

7.A.3.2: Represent, write, solve, and graph problems leading to linear inequalities with one variable in the form x + p > q and x + p < q, where p, and q are nonnegative rational numbers.

Attachments

- Exit Ticket—Pie_Everything, Part 1 - Spanish.docx
- Exit Ticket—Pie_Everything, Part 1 - Spanish.pdf
- Exit Ticket—Pie_Everything, Part 1.docx
- Exit Ticket—Pie_Everything, Part 1.pdf
- Lesson Slides—Pie_Everything, Part 1.pptx
- Linear Inequalitites—Pie_Everything, Part 1 - Spanish.docx
- Linear Inequalitites—Pie_Everything, Part 1 - Spanish.pdf
- Linear Inequalitites—Pie_Everything, Part 1.docx
- Linear Inequalitites—Pie_Everything, Part 1.pdf
- Sweet Inequalities Signs—Pie_Everything, Part 1.docx
- Sweet Inequalities Signs—Pie_Everything, Part 1.pdf
- Sweet Inequalitites (Teacher Guide)—Pie_Everything, Part 1.pdf
- Sweet Inequalitites—Pie_Everything, Part 1 - Spanish.docx
- Sweet Inequalitites—Pie_Everything, Part 1 - Spanish.pdf
- Sweet Inequalitites—Pie_Everything, Part 1.docx
- Sweet Inequalitites—Pie_Everything, Part 1.pdf
- What Numbers Work—Pie_Everything, Part 1 - Spanish.docx
- What Numbers Work—Pie_Everything, Part 1 - Spanish.pdf
- What Numbers Work—Pie_Everything, Part 1.docx
- What Numbers Work—Pie_Everything, Part 1.pdf

Materials

- Lesson Slides (attached)
- Linear Inequalities cards (attached; one set per pair; printed one-sided)
- What Numbers Work handout (attached; one per pair; printed two-sided)
- Sweet Inequalities Signs (attached; one per classroom; printed one-sided)
- Sweet Inequalities handout (attached; one per group; printed two-sided)
- Sweet Inequalities (Teacher Guide) document (attached)
- Exit Ticket handout (attached; one per student; printed one-sided)

10 minutes

Engage

Teacher's Note: Card Matching Preparation

Before you begin, print the attached **Linear Inequalities** cards (one copy per pair of students in your class). Consider printing on cardstock paper, especially if you plan to reuse these cards.

Once printed, cut out the cards. All of these cards are the same size for easy cutting.

Introduce the lesson using the attached **Lesson Slides**. Display **slide 3** and share the essential question: *How can inequalities represent relationships?* Then move to **slide 4** to outline lesson objectives.

Display **slide 5** and share the Card Matching strategy with the class. Have students find a partner or assign partners. Distribute one set of **Linear Inequalities** cards to each pair. Remind students to be kind and careful with the printed cards. Ask pairs to complete the card matching activity that involves matching various scenarios with one-variable inequalities. Give about five minutes for them to complete the matching activity, then have each pair join another pair to discuss their choices, using guiding questions like “Why did you match those cards?” or “How do you know the inequality symbol is correct?”

Optional Modification for Distance Learning

To make use of these activities in an online or distance learning environment, consider using the “card sort” feature of Amplify Classroom or the “matching game” option of Quizlet. You could also have students describe their thought processes for each pair of matched cards as part of an online discussion board. Download all attachments to use this lesson in Google Classroom.

20 minutes

Explore

Show **slide 6**. With students still in pairs, distribute a copy of the attached **What Numbers Work** handout to each pair. Ask them to list numbers that make the given inequality true, along with those that do not. Encourage pairs to discuss their reasoning. Students are to show the numbers that work on the number line (graphing the inequality). This activity allows students to visualize the solution set of the inequality. Students then answer the question: *Why do certain numbers not work?*

Display **slide 7** and direct students' attention to the back side of their handout. Have students reflect on their findings and write their "rule" (an explanation) for graphing inequalities. Ask a few volunteers to share their rules, then facilitate a class discussion about the relationship between the numbers from the table that worked with the values on the number line.

Teacher's Note: Student Conversations

As students work, walk around the room and listen for discussions that lead to steps for solving inequalities or that make connections to solving equations. Use what you hear to help guide the next phase of the lesson.

15 minutes

Explain

Move to **slide 8** and ask the class, *How can you solve $x - 3 < 15$ without making a table?* Guide students through isolating x to solve the inequality, emphasizing each step. Ensure that students understand the process, checking for comprehension by asking them to explain each step back to you.

Once students are comfortable, display **slide 9**. Instruct students to try to independently solve the inequality: $x + 2 \geq 11$. Have students also graph the solution on a number line. Use this time to make sure there are not any misunderstandings about graphing on a number line.

Display **slide 10** and ask students to solve this challenge question: $19 < x + 6$. Use this question to deepen understanding. As students are solving algebraically and graphing the inequality, address any lingering misconceptions.

Teacher's Note: Guiding the Lesson

It is a common misconception that "the direction the inequality points" determines the direction of the arrow on the number line. Since this only applies when the variable is on the left, encourage students to use reasoning and test values to confirm the direction.

For example, when students solve the challenge problem, they should get $13 < x$. If they test $x = 0$, they see that zero does not make the inequality true, so their arrow should point away from 0. If they picked $x = 20$ to test, twenty does make the inequality true, so their arrow would point towards twenty. Use language like "towards" and "away" instead of "left" and "right" for consistency.

30 minutes

Extend

Teacher's Note: Activity Preparation

Before beginning this phase of the lesson, print the attached **Sweet Inequalities Signs** and cut them in half, creating 24 signs. Hang the signs randomly around the room. Students will use these signs to record their final answers. If limited on space, consider using the hallway to hang signs.

Use the attached **Sweet Inequalities (Teacher Guide)** document as needed. The first page shows what students' work may look like, while the second page shows which signs correspond to each problem. Print at least the second page, as you will use this page to quickly check students' work and give feedback.

Organize students into groups of 2–3 and give each group a copy of the attached **Sweet Inequalities** handout. Display **slide 11** and preview the activity. Inform students that they are to match their verbal descriptions of inequalities on their handout with the algebraic representations, algebraic solutions, and number line solutions that are hanging around the room. Each group is to look around the room for the inequality, solution, and number line that corresponds to the verbal description. Then they are to record the letter that is printed in the top-left corner of the sign on their handout.

Direct students' attention to the *Show Your Work* side of their handout. As they complete the front side of their handout, remind them to record the letters of the corresponding signs that are hung around the room. Each problem has three corresponding signs; encourage students to not visit a sign that has another group. All signs should be used exactly once. To ensure all group members participate, consider requiring each group member's distinct handwriting on the handout. This activity allows students to choose the order they complete their work.

Give students time to work at their own pace. Some may visit signs in order of their algebraic work; others might search for matching number lines first. Allow either approach to foster their engagement and problem-solving.

When a group finishes the *Your Results* side of their handout, have them bring you their handout. Use the second page of the attached **Sweet Inequalities (Teacher Guide)** document to quickly check their results and give feedback.

Teacher's Note: Giving Feedback

Consider student needs and class time as you provide feedback. If a group gets done with a lot of class time remaining and many errors, consider telling them how many are incorrect, but not which ones are incorrect. If a group has many errors, consider telling them which ones are correct. If only two letters are incorrect, consider pointing out which one is incorrect (but not both) and telling them that there is one more that is incorrect (that they will need to correct).

For example, if a group mixed up the numbers lines for problems 1 and 4, and you tell them that those are the two mistakes, then the group can mindlessly switch the letters and not think about their mistakes. Instead if you only share that the number line is incorrect for problem 1 and that there is one other mistake, then the group is required to critically think to correct their mistakes.

5 minutes

Evaluate

Display **slide 12** and introduce the Exit Ticket strategy. Distribute a copy of the attached **Exit Ticket** handout to each student. Here students are to analyze two solved inequalities and determine which was solved incorrectly, justifying the rationale behind their choice.

Have students correct the work and graph the solution on a number line. Collect the handouts to assess comprehension and identify any remaining misconceptions.

Resources

- K20 Center. (n.d.). Amplify classroom. Tech Tools. https://learn.k20center.ou.edu/tech-tool/1081
- K20 Center. (n.d.). Bell ringers and exit tickets. Strategies. https://learn.k20center.ou.edu/strategy/125
- K20 Center. (n.d.). Card matching. Strategies. https://learn.k20center.ou.edu/strategy/1837
- K20 Center. (n.d.). Google classroom. Tech Tools. https://learn.k20center.ou.edu/tech-tool/628
- K20 Center. (n.d.). Google docs. Tech Tools. https://learn.k20center.ou.edu/tech-tool/2327
- K20 Center. (n.d.). Quizlet. Tech Tools. https://learn.k20center.ou.edu/tech-tool/666