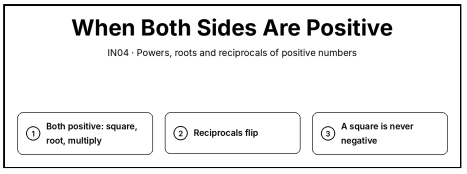
When Both Sides Are Positive: teacher script

IN04-V1 · IN04 Powers, roots and reciprocals of positive numbers · teachers only. Without a screen, read each Say line and draw each Draw step on the board. About 84 seconds as a video.

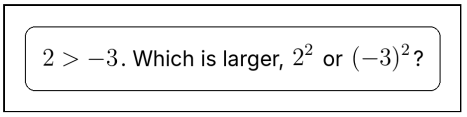
01



Say. Powers, roots and reciprocals. When both sides are positive, you can square them, take roots, and multiply two inequalities. Reciprocals flip the sign. And a square is never negative.

Draw. Write the title “When Both Sides Are Positive” and the steps: 1. Both positive: square, root, multiply; 2. Reciprocals flip; 3. A square is never negative.

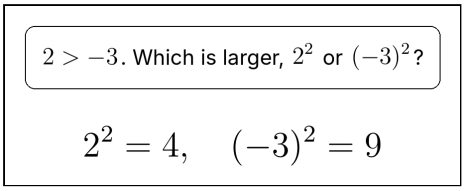
02



Say. 2 is greater than negative 3. Which is larger, 2 squared or negative 3 squared?

Draw. Clear the board. Write “2 > −3. Which is larger, 2² or (−3)²?” in a box at the top.

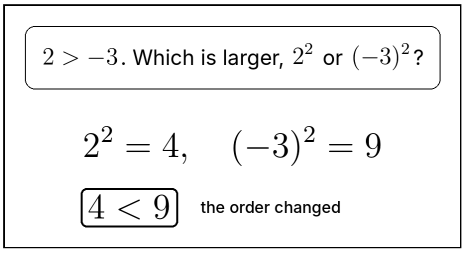
03



Say. 2 squared is 4, and negative 3 squared is 9.

Draw. Write 2² = 4, (−3)² = 9 on the next line.

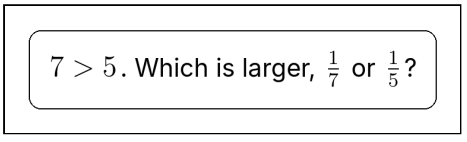
04



Say. 4 is less than 9: squaring changed the order, because one side was negative. Square only when both sides are positive.

Draw. Write 4 < 9 and box it on the next line. Beside it, write “the order changed”.

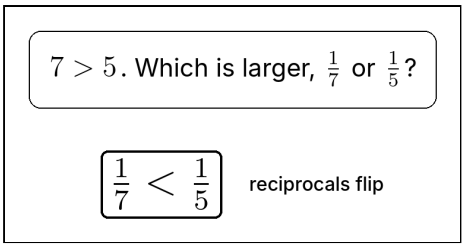
05



Say. 7 is greater than 5. Which is larger, one seventh or one fifth?

Draw. Clear the board. Write “7 > 5. Which is larger, 1/7 or 1/5?” in a box at the top.

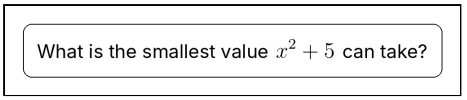
06



Say. Sevenths are smaller pieces than fifths, so one seventh is less than one fifth. Reciprocals of two positive numbers flip the sign.

Draw. Write 1/7 < 1/5 and box it on the next line. Beside it, write “reciprocals flip”.

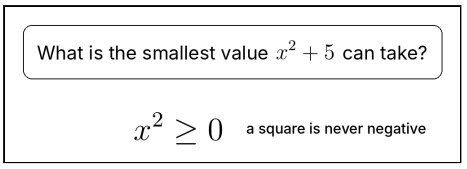
07



Say. What is the smallest value x squared plus 5 can take?

Draw. Clear the board. Write “What is the smallest value x² + 5 can take?” in a box at the top.

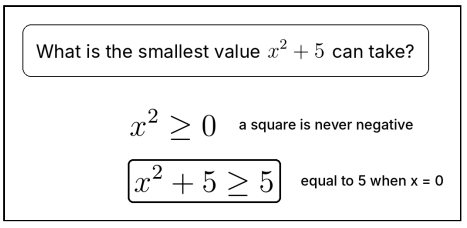
08



Say. A square is never negative: x squared is at least 0.

Draw. Write x² \ge 0 on the next line. Beside it, write “a square is never negative”.

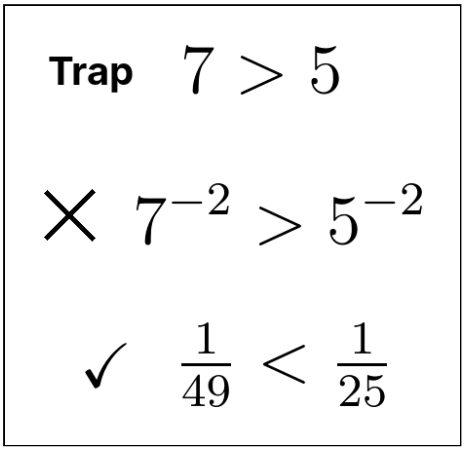
09



Say. So x squared plus 5 is at least 5, and it equals 5 when x is 0. The smallest value is 5.

Draw. Write x² + 5 \ge 5 and box it on the next line. Beside it, write “equal to 5 when x = 0”.

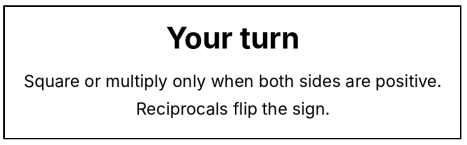
10



Say. Watch for the trap: negative powers are reciprocals, so they don't keep the sign. 7 to the negative 2 is 1 over 49, which is less than 1 over 25.

Draw. Clear the board. Write “Trap” and 7 > 5. Below, write 7⁻² > 5⁻² and cross it out ×. Then write 1/49 < 1/25 with a tick ✓.

11



Say. Now it is your turn. Square or multiply only when both sides are positive, and remember that reciprocals flip the sign.

Draw. Point to today’s activity: Square or multiply only when both sides are positive. Reciprocals flip the sign.