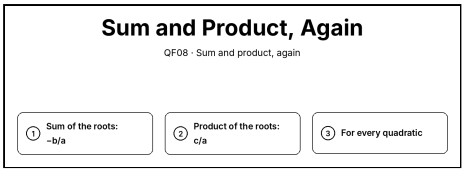
Sum and Product, Again: teacher script

QF08-V1 · QF08 Sum and product, again · teachers only. Without a screen, read each Say line and draw each Draw step on the board. About 90 seconds as a video.

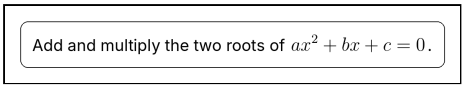
01



Say. Sum and product, again. The roots add up to negative b over a, and multiply to c over a, for every quadratic, even one that doesn't factor.

Draw. Write the title “Sum and Product, Again” and the steps: 1. Sum of the roots: −b/a; 2. Product of the roots: c/a; 3. For every quadratic.

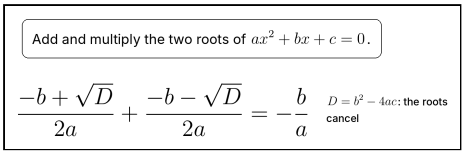
02



Say. Add and multiply the two roots of a x squared plus b x plus c equals 0.

Draw. Clear the board. Write “Add and multiply the two roots of ax² + bx + c = 0.” in a box at the top.

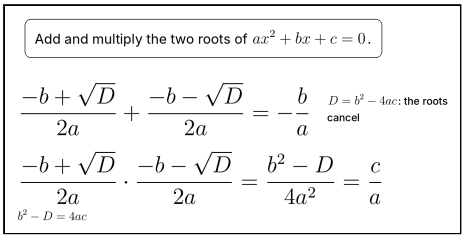
03



Say. Write D for b squared minus 4 a c. Add the two roots from the formula and the roots cancel: negative 2 b over 2 a, which is negative b over a.

Draw. Write (−b + \sqrt D)/(2a) + (−b − \sqrt D)/(2a) = −\dfrac ba on the next line. Beside it, write “D = b² − 4ac: the roots cancel”.

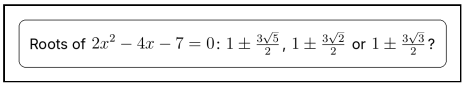
04



Say. Multiply them: b squared minus D, over 4 a squared. b squared minus D is 4 a c, so the product is c over a.

Draw. Write (−b + \sqrt D)/(2a) · (−b − \sqrt D)/(2a) = (b² − D)/(4a²) = \dfrac ca on the next line. Beside it, write “b² − D = 4ac”.

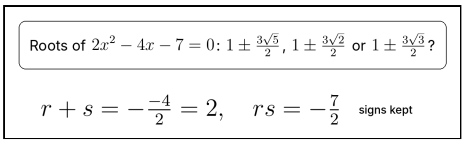
05



Say. Which are the roots of 2 x squared minus 4 x minus 7 equals 0? Three pairs to choose from, and no solving.

Draw. Clear the board. Write “Roots of 2x² − 4x − 7 = 0: 1 ± 3√5/2, 1 ± 3√2/2 or 1 ± 3√3/2?” in a box at the top.

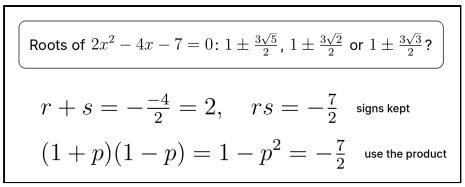
06



Say. The roots add up to 2, and multiply to negative 7 halves.

Draw. Write r + s = −(−4)/2 = 2, rs = −7/2 on the next line. Beside it, write “signs kept”.

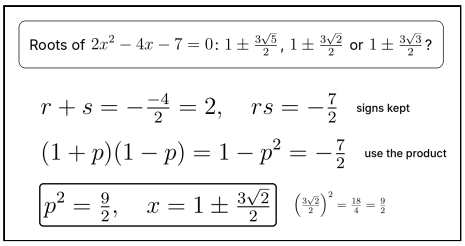
07



Say. Every pair adds up to 2, so use the product: 1 plus p, times 1 minus p, is 1 minus p squared.

Draw. Write (1 + p)(1 − p) = 1 − p² = −7/2 on the next line. Beside it, write “use the product”.

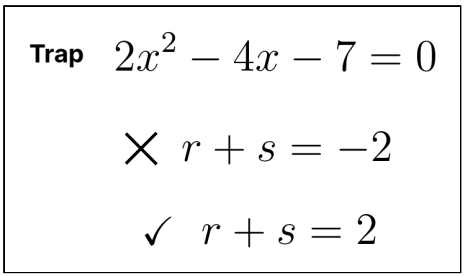
08



Say. So p squared is 9 halves, and 3 root 2 over 2, squared, is 9 halves. The roots are 1 plus or minus 3 root 2 over 2.

Draw. Write p² = 9/2, x = 1 ± 3√2/2 and box it on the next line. Beside it, write “(3√2/2)² = 18/4 = 9/2”.

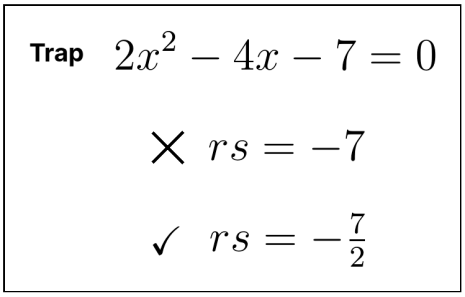
09



Say. Watch for the trap. Mind the minus: the sum is negative b over a, and b is negative 4.

Draw. Clear the board. Write “Trap” and 2x² − 4x − 7 = 0. Below, write r + s = −2 and cross it out ×. Then write r + s = 2 with a tick ✓.

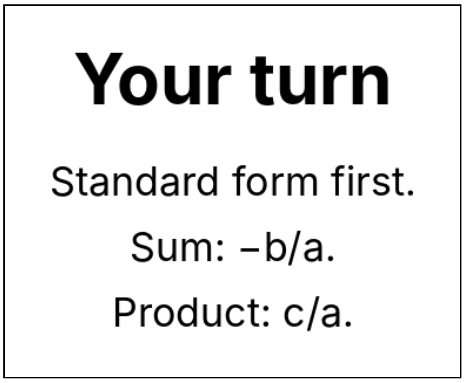
10



Say. And the product isn't negative 7: divide by a. The product is c over a.

Draw. Clear the board. Write “Trap” and 2x² − 4x − 7 = 0. Below, write rs = −7 and cross it out ×. Then write rs = −7/2 with a tick ✓.

11



Say. Now it is your turn. Standard form first, then the sum is negative b over a and the product is c over a.

Draw. Point to today’s activity: Standard form first. Sum: −b/a. Product: c/a.