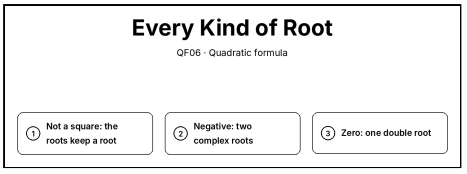
Every Kind of Root: teacher script

QF06-V2 · QF06 Quadratic formula · teachers only. Without a screen, read each Say line and draw each Draw step on the board. About 102 seconds as a video.

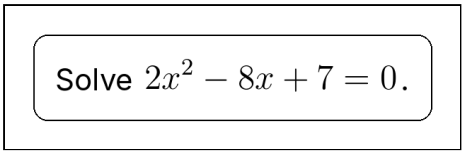
01



Say. Every kind of root. When b squared minus 4 a c isn't a square, the roots keep a root. When it is negative, there are two complex roots. When it is 0, there is one double root.

Draw. Write the title “Every Kind of Root” and the steps: 1. Not a square: the roots keep a root; 2. Negative: two complex roots; 3. Zero: one double root.

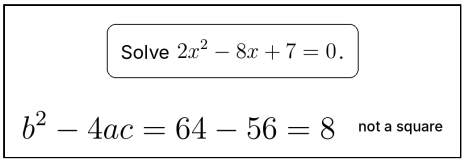
02



Say. Solve 2 x squared minus 8 x plus 7 equals 0.

Draw. Clear the board. Write “Solve 2x² − 8x + 7 = 0.” in a box at the top.

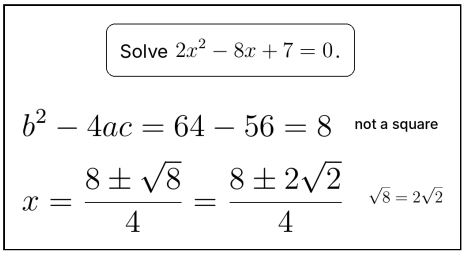
03



Say. First the part under the root: 64 minus 56 is 8. 8 isn't a square.

Draw. Write b² − 4ac = 64 − 56 = 8 on the next line. Beside it, write “not a square”.

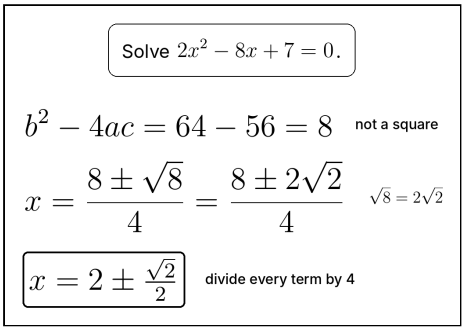
04



Say. So x is 8 plus or minus root 8, all over 4, and root 8 is 2 root 2.

Draw. Write x = 8 ± √8/4 = 8 ± 2√2/4 on the next line. Beside it, write “√8 = 2√2”.

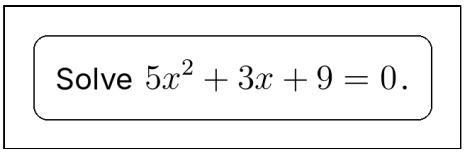
05



Say. Divide every term by 4: x equals 2, plus or minus root 2 over 2.

Draw. Write x = 2 ± √2/2 and box it on the next line. Beside it, write “divide every term by 4”.

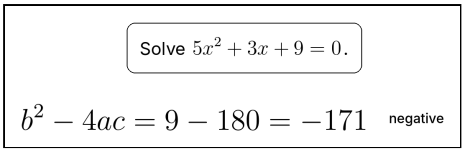
06



Say. Solve 5 x squared plus 3 x plus 9 equals 0.

Draw. Clear the board. Write “Solve 5x² + 3x + 9 = 0.” in a box at the top.

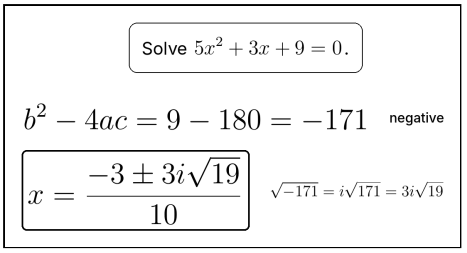
07



Say. The part under the root is 9 minus 180, which is negative 171.

Draw. Write b² − 4ac = 9 − 180 = −171 on the next line. Beside it, write “negative”.

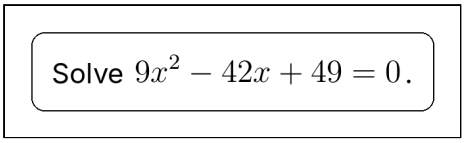
08



Say. Root negative 171 is 3 i root 19. So there are two complex roots: negative 3, plus or minus 3 i root 19, all over 10.

Draw. Write x = (−3 ± 3i√19)/10 and box it on the next line. Beside it, write “√(−171) = i√171 = 3i√19”.

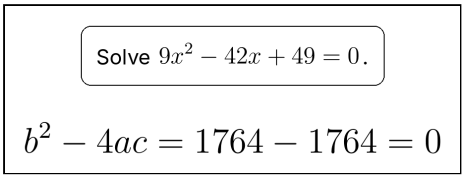
09



Say. Solve 9 x squared minus 42 x plus 49 equals 0.

Draw. Clear the board. Write “Solve 9x² − 42x + 49 = 0.” in a box at the top.

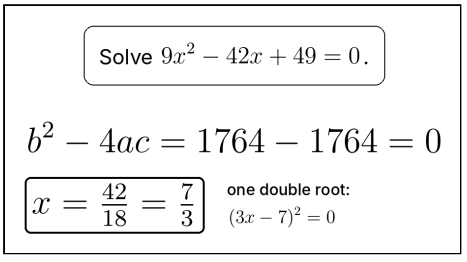
10



Say. The part under the root is 1764 minus 1764, which is 0.

Draw. Write b² − 4ac = 1764 − 1764 = 0 on the next line.

11



Say. Plus or minus 0 changes nothing, so there is one double root: 42 over 18, which is 7 thirds.

Draw. Write x = 42/18 = 7/3 and box it on the next line. Beside it, write “one double root: (3x − 7)² = 0”.

12

Trap $\dfrac{8 \pm 2\sqrt{2}}{4}$

$\times\ 8 \pm \dfrac{\sqrt{2}}{2}$

$\checkmark\ \ 2 \pm \dfrac{\sqrt{2}}{2}$

Say. Watch for the trap. Divide not just the root by 4: the whole top is over 2 a.

Draw. Clear the board. Write “Trap” and 8 ± 2√2/4. Below, write 8 ± √2/2 and cross it out ×. Then write 2 ± √2/2 with a tick ✓.

13

Trap $b^2 - 4ac = -171$

$\times$ no solution

$\checkmark$ two complex roots

Say. And a negative number under the root means not no solution, but two complex roots.

Draw. Clear the board. Write “Trap” and $b^2 - 4ac = -171$. Below, write no solution and cross it out ×. Then write two complex roots with a tick ✓.

14

Your turn

Not a square: keep the root, and tidy it.
Negative: two complex roots.
Zero: one double root.

Say. Now it is your turn. Not a square: keep the root, and tidy it. Negative: two complex roots. Zero: one double root.

Draw. Point to today’s activity: Not a square: keep the root, and tidy it. Negative: two complex roots. Zero: one double root.