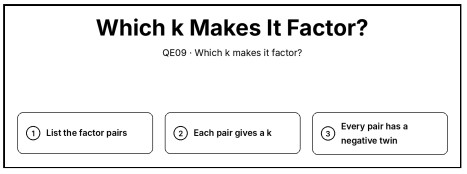
Which k Makes It Factor?: teacher script

QE09-V1 · QE09 Which k makes it factor? · teachers only. Without a screen, read each Say line and draw each Draw step on the board. About 96 seconds as a video.

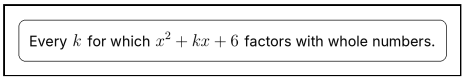
01



Say. Which values of k make a quadratic factor with whole numbers? List the factor pairs. Each pair, in each order, gives a value of k. And every pair has a negative twin.

Draw. Write the title “Which k Makes It Factor?” and the steps: 1. List the factor pairs; 2. Each pair gives a k; 3. Every pair has a negative twin.

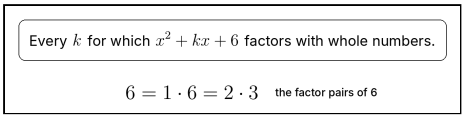
02



Say. Find every k for which x squared, plus k x, plus 6, factors with whole numbers.

Draw. Clear the board. Write “Every k for which x² + kx + 6 factors with whole numbers.” in a box at the top.

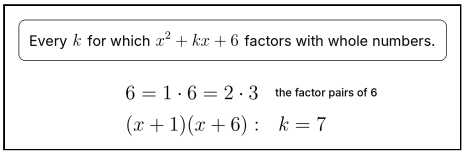
03



Say. The factor pairs of 6 are 1 and 6, and 2 and 3.

Draw. Write 6 = 1 · 6 = 2 · 3 on the next line. Beside it, write “the factor pairs of 6”.

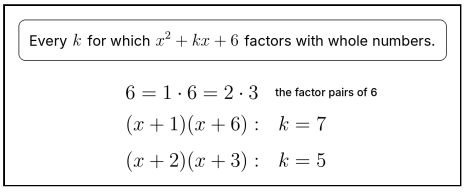
04



Say. x plus 1, times x plus 6, has the middle term 7 x: k is 7.

Draw. Write (x + 1)(x + 6):\ \ k = 7 on the next line.

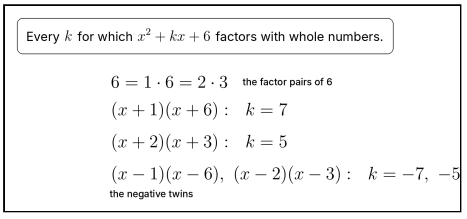
05



Say. x plus 2, times x plus 3: k is 5.

Draw. Write (x + 2)(x + 3):\ \ k = 5 on the next line.

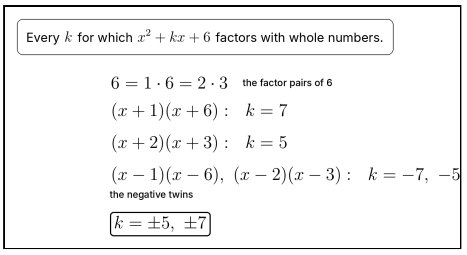
06



Say. Two negatives also multiply to 6: they give negative 7 and negative 5.

Draw. Write (x − 1)(x − 6),\ (x − 2)(x − 3):\ \ k = −7,\ −5 on the next line. Beside it, write “the negative twins”.

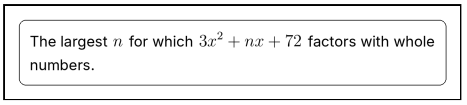
07



Say. So there are four values: k equals plus or minus 5, or plus or minus 7.

Draw. Write k = ± 5,\ ± 7 and box it on the next line.

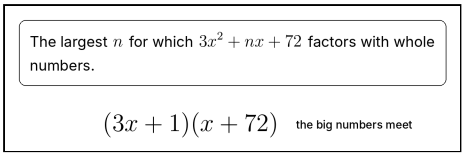
08



Say. Find the largest n for which 3 x squared, plus n x, plus 72, factors with whole numbers.

Draw. Clear the board. Write “The largest n for which 3x² + nx + 72 factors with whole numbers.” in a box at the top.

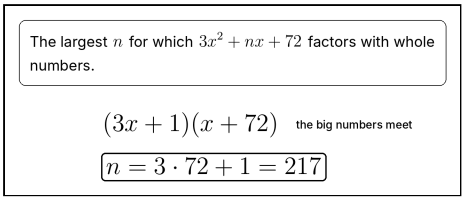
09



Say. To make the middle term as big as possible, the big numbers must meet: 3 x meets 72, and 1 meets x.

Draw. Write (3x + 1)(x + 72) on the next line. Beside it, write “the big numbers meet”.

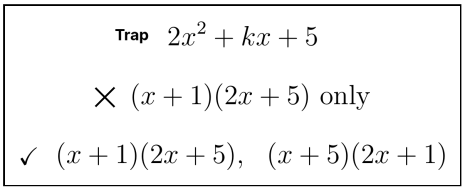
10



Say. So n is 3 times 72, plus 1, which is 217.

Draw. Write n = 3 · 72 + 1 = 217 and box it on the next line.

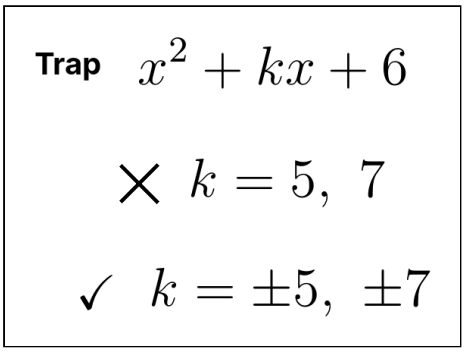
11



Say. Watch for the trap: don't try only one order. x plus 1, times 2 x plus 5, gives k equals 7, but x plus 5, times 2 x plus 1, gives 11. Try both orders.

Draw. Clear the board. Write “Trap” and 2x² + kx + 5. Below, write (x + 1)(2x + 5) only and cross it out ×. Then write (x + 1)(2x + 5),\ \ (x + 5)(2x + 1) with a tick ✓.

12



Say. Another trap: don't forget the negative twins. The answer is plus or minus 5, and plus or minus 7.

Draw. Clear the board. Write “Trap” and x² + kx + 6. Below, write k = 5,\ 7 and cross it out ×. Then write k = ± 5,\ ± 7 with a tick ✓.

13

Your turn

Factor pairs, both orders, negative twins.
For the largest, the big numbers meet.

Say. Now it is your turn. List the factor pairs, try both orders, and remember the negative twins.

Draw. Point to today’s activity: Factor pairs, both orders, negative twins. For the largest, the big numbers meet.