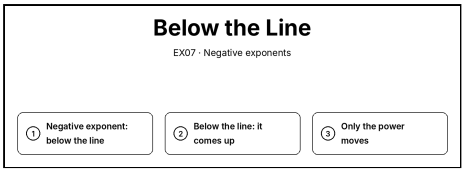
Below the Line: teacher script

EX07-V1 · EX07 Negative exponents · teachers only. Without a screen, read each Say line and draw each Draw step on the board. About 92 seconds as a video.

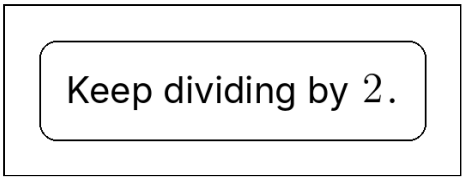
01



Say. Below the line. A power with a negative exponent goes below the line, and one below the line comes up. Only the power moves, not the number in front.

Draw. Write the title “Below the Line” and the steps: 1. Negative exponent: below the line; 2. Below the line: it comes up; 3. Only the power moves.

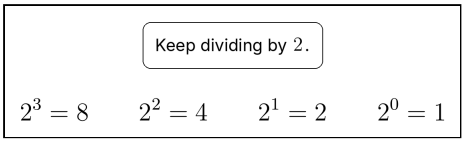
02



Say. Keep dividing by two.

Draw. Clear the board. Write “Keep dividing by 2.” in a box at the top.

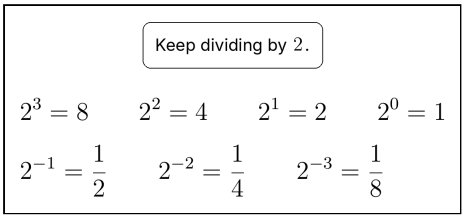
03



Say. 2^3 is eight. Divide by two each time: four, two, one. So $2^0 = 1$.

Draw. Write $2^3 = 8$ $2^2 = 4$ $2^1 = 2$ $2^0 = 1$ on the next line.

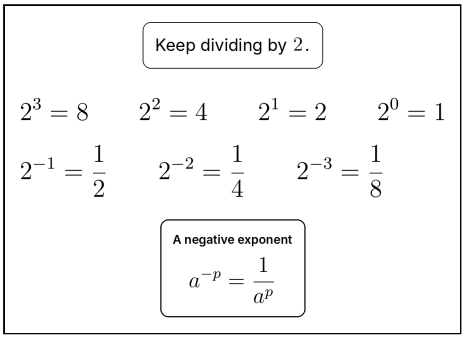
04



Say. Keep going past zero: one half, one quarter, one eighth.

Draw. Write $2^{-1} = 1/2$ $2^{-2} = 1/4$ $2^{-3} = 1/8$ on the next line.

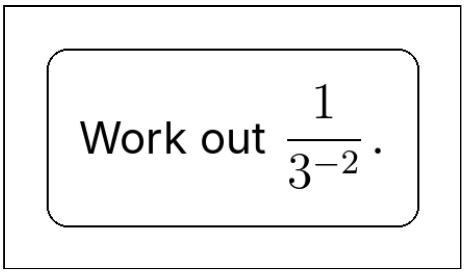
05



Say. So a negative exponent means one over the power: 2^{-3} is one over 2^3. It makes a fraction, never a negative number.

Draw. Write the rule in a box: $a^{-}p = 1/(ap)$.

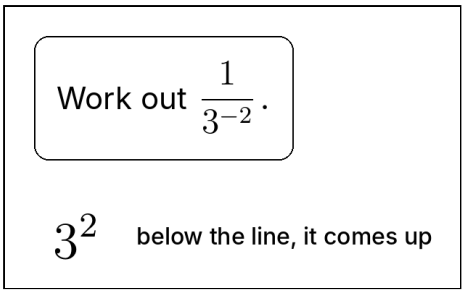
06



Say. Now work out one over 3^{-2}.

Draw. Clear the board. Write “Work out $1/3^{-2}$.” in a box at the top.

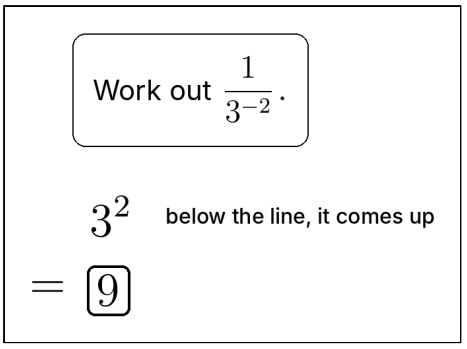
07



Say. The power below the line has a negative exponent, so it comes up to the top: 3^2.

Draw. Write 3^2 on the next line. Beside it, write “below the line, it comes up”.

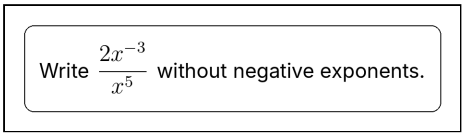
08



Say. That is nine.

Draw. Write = 9 and box it on the next line.

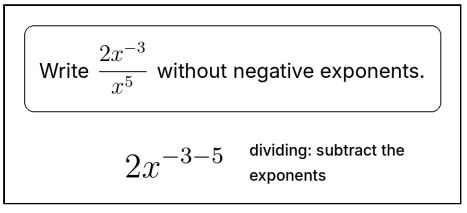
09



Say. Write $2x^{-3}$ over x^5 without negative exponents.

Draw. Clear the board. Write “Write $2x^{-3}/x^5$ without negative exponents.” in a box at the top.

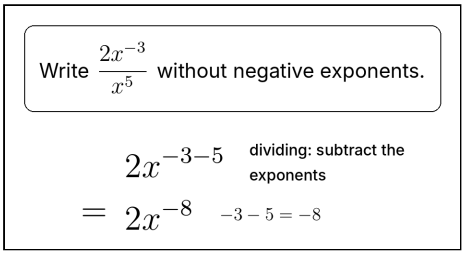
10



Say. Dividing subtracts the exponents: negative three, take away five.

Draw. Write $2x^{-3-5}$ on the next line. Beside it, write “dividing: subtract the exponents”.

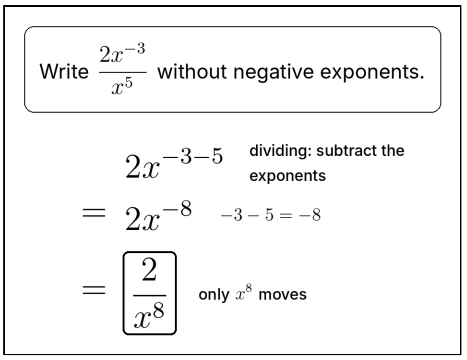
11



Say. That is negative eight.

Draw. Write = $2x^{-8}$ on the next line. Beside it, write “$-3 - 5 = -8$”.

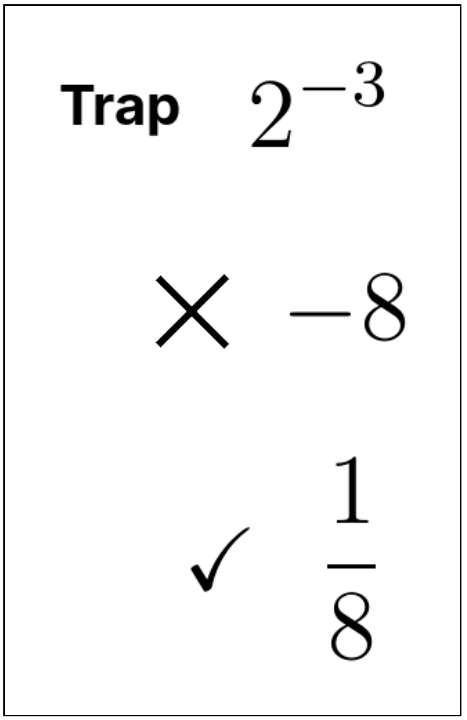
12



Say. Only x^8 moves below the line. The two stays on top.

Draw. Write = $2/x^8$ and box it on the next line. Beside it, write "only x^8 moves".

13



Say. Watch for the trap: a negative answer. 2^{-3} is not −8. It is a fraction: one eighth.

Draw. Clear the board. Write "Trap" and 2^{-3}. Below, write −8 and cross it out ×. Then write 1/8 with a tick ✓.

14

Trap $2x^{-3}$

$\times \quad \frac{1}{2x^3}$

$\checkmark \quad \frac{2}{x^3}$

Say. And only the power moves. $2x^{-3}$ is not one over $2x^3$. The exponent belongs to x, so it is two over x^3.

Draw. Clear the board. Write “Trap” and $2x^{-3}$. Below, write $1/(2x^3)$ and cross it out ×. Then write $2/x^3$ with a tick ✓.

15

Your turn

A negative exponent:
move the power across the line

Say. Now it is your turn. When an exponent is negative, move the power across the line.

Draw. Point to today’s activity: A negative exponent: move the power across the line