Difficult Two-Step Equations on the ISEE

All Levels

LESSON GOAL: Learn the perfect method to tackle two-step equation on the ISEE.

ISEE Question: Three more than five times John's age is twice his sister's age. If John's sister is 29, how old is John?

(A) 11
(B) 15
(C) 19
(D) 21

Solution: Ok, what?

Helpful Tip: This question sounds very confusing, which probably means that it isn't all too difficult mathematically. On the ISEE, the more time you have to spend understanding the problem, the less time you are left with to solve it, since the test-makers have to make sure you can do everything in about one minute.

Of course, we can solve this problem by ***plugging in*** the answer choices, but let's learn a faster, more mathematical solution …

STEP 1: We need to ***translate*** this word problem it into a ***mathematical equation***. Let's use "j" for John's unknown age. "Three more" means "+ 3", "five times" is "x 5", "is" is an equal sign, and "twice" means "x 2". So the equation in the question is "5j + 3 = 2 x 29". The right side is easy: 2 x 29 = 58.

STEP 2: On for the left side, we need to ***isolate*** the variable by cancelling the numbers around it (the "5" and the "3").

Remember that we cancel in ***reverse PEMDAS*** order: we start with the "3", then the "5".

STEP 3: To cancel addition by 3, we have to do the opposite operation: subtract a 3. AND we have to do it on BOTH sides of the equation (or they won't equal each other anymore).

$$\begin{aligned} 5j + 3 &= 58 \\ -3 \quad &-3 \\ 5j &= 55 \end{aligned}$$

STEP 4: Next, we have to cancel multiplication by 5 by doing the opposite: dividing by 5, on BOTH sides.

$$\begin{aligned} 5j &= 55 \\ \div 5 \quad &\div 5 \\ j &= 11 \end{aligned}$$

Helpful Tip: If you have a few seconds to spare, and if you're a bit uncertain about your answer, double-check your work by plugging in your result into the original equation. In this case "5 x 11 + 3 = 58", so we are good.