Cross Out the Cross Multiplication to prevent a common misunderstanding

Cross multiplication: the cross products of a proportion are equal

Cross multiplication has been a standard component in math courses for many years. So why should we cross out something? We are on a path to teach **more** math, instead of less, correct?

Picture my imaginary niece in 7th grade, a normal middle school girl, so a student with many other things on her teenage radar than mathematics. She happened to have zoned out a few lessons, but a cryptic message from the front of the classroom did take root in her memory. It contained a word spoken with slightly more emphasis: *'cross multiplication'* and it appeared to be a simple magical trick leading to an answer for a complicated equation with fractions:

Her thinking goes like: "I don't like fractions, so you can get rid of that complicated original equation with fractions by making a new equation. This one has a multiplication on both sides and has no fractions, here's how it works: ***multiply some numbers from both sides of the original equation to equal some from top and bottom of the fractions.*** Great, now it looks easy!"

She wonders why she sometimes gets in incorrect answer while she knows her multiplication is correct??? Many students did not get the part about when a cross multiplication can be used: only for two fractions or proportions that are equal, and they start using it whenever they see an equation that has more than one fraction, such as: $\frac{a}{b} = e - \frac{c}{d}$ and make: $ad = e - bc$.

Do we have a better approach than introducing a math concept with an unexplained verbal sentence?

Not to teach anything unnecessary at all! Just stick to the mantra that always works: to keep things balanced do the same operation at both sides of your equation, and estimate before you calculate!

If they cannot figure it out themselves (and you would be surprised how many can, if you challenge them and allow time), you can walk them through the process. Different colors clearly show the steps:

- $\frac{a}{b} = \frac{c}{d}$ multiply both sides by b **a/b = c/d**
- $\frac{ab}{b} = \frac{bc}{d}$ b/b = 1, so cross out the b's on the left side **ab/b = bc/d**
- $\frac{a}{1} = \frac{bc}{d}$ multiply both sides by d **a = bc/d**
- $ad = \frac{bcd}{d}$ now cross out the d's on the right side **ad = bcd/d**
- $ad = bc$ here's your cross multiplication explained **ad = bc**

If they keep hearing the cross multiplication command and insist on using it, at least ask them to say the word under their breath with a long sss in the middle, the 'is' for the necessary equal sign in the middle.