

## Conceptual Task: Rationalizing Rational Functions

Students in a math class are learning about rational equations and expressions. The teacher of the class asks each student to write their own rational function that follows these rules:

1. The function must have exactly 3 invalid values of  $x$ .
2.  $x = 0$  cannot be an invalid value of the function.
3. The function must have more than 2 roots.
4. The function must be fully simplified.

SMP	
1	2
3 ✓	4
5	6 ✓
7 ✓	8

Students pair up to compare and critique their functions. Two students, Nicole and Wayne, have the following discussion.

Nicole's function	Wayne's function
$f(x) = \frac{x(x+1)(x+2)}{(x-1)(x-2)(x-3)}$	$f(x) = \frac{(x+2)(x^2-2x-3)}{x(x^2+x-2)}$

Wayne, your function doesn't follow the rules. One of the invalid values of your function is 0. I know this because of the lone  $x$  term being multiplied in your function.



Nicole



Wayne

Your function also contains a lone  $x$  term, so doesn't that mean your function isn't following the rules either?

Mine is different because you put a lone  $x$  in the denominator. Also, your function may not have three roots. It's hard to tell because you didn't fully factor.



Nicole



Wayne

I believe there ARE three roots of my function. The first is  $x = 2$ , then  $(x^2 - 2x - 3)$  contains two roots, so that makes three.

