Breaking Down a Mathematics Standard

KAS: **KY.HS.F.8**

What is the domain/conceptual category/big idea?	Functions - Building Functions

Standards for Mathematical Practice

MP.1. Make sense of problems and persevere in solving them.	MP.5. Use appropriate tools strategically.
MP.2. Reason abstractly and quantitatively.	MP.6. Attend to precision.
MP.3. Construct viable arguments and critique the reasoning of others.	MP.7. Look for and make use of structure.
MP.4. Model with mathematics.	MP.8. Look for and express regularity in repeated reasoning.

Cluster: What is the broader understanding that the standard plays a role in building? Build new functions from existing functions.

Standards	Clarifications
• Identify the target of the standard: o conceptual understanding o procedural skill/fluency o application Consider how the target of the standard will have an impact on instruction and assessment. (For more information, refer to p. 7, 10 and 15 of KAS for Mathematics.) Conceptual Understanding: understanding of mathematical concepts, operations, & relations. More than knowing isolated facts & methods. Students should be able to make sense of why a mathematical idea is important & the kinds of contexts in which it is useful. Students connect prior knowledge to new ideas & concepts • What key mathematics should students know and be able to do? Identify & explain the effects of replacing f(x) with $f(x)+k$ $kf(x)$ $f(kx)$ $f(x+k)$ } for positive & negative values of k	• What are the specific representations/strategies that will need to be considered when planning instruction? While familiar families of functions may help students get a sense for the transformations, it is important that students understand the ideas for any function. Students should recognize even & odd functions from graphs & expressions. (Symmetry) • What are the possible misconceptions that will need to be addressed during instruction? Students may find horizontal translations counterintuitive. • Students sometimes misinterpret the parentheses in function notation as multiplication • Falsely calculating f(x+3) like it were the distributive property f(x) + f(3) Coherence: Previous Grade → Current Standard → Upcoming Grade • How does this standard build off of prior learning? Grade 8 → the notion of a function is introduced but the majority of the understanding is around linear vs nonlinear • How does this standard support future learning? In High School → students expand their focus to linear, quadratic, & exponential functions • How does this standard connect to other standards (or even other clusters or domains)? geometric transformations of graphs of functions Relationship between algebraic transformations of equations

(margin note: Notation issues)

Attending to the Standards for Mathematical Practice

• How are students engaging in the mathematical practices as they learn this content? (For more information, refer to p. 12-15 of KAS for Mathematics.)

MP.5 → Students use technology to explore how changing the value of k impacts the graph of the function

MP.3 → Students use graphs to create plausible arguments about the effects of transformations.

MP.8 → Students perform concrete experiments with slight variations to try to find a rhythm or pattern in the process being repeated