eTech Math Mess Educator's Guide

Segment Title: The Magician – Marko the Magnificent

Alignment to Common Core Clusters	**6.EE** Apply and extend previous understandings of arithmetic to algebraic expressions.
Critical Focus Area(s) and Rationale	6.EE.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem. Students should begin to see that algebraic expressions allow us to generalize arithmetic in our base 10 number system. Marko's "trick" is simply a manipulation of algebraic properties to determine a fixed solution, regardless of the value chosen for the variable.
Focus for Media Interaction / Suggested Classroom Activities	Tell students that they are about to see an animated clip that allows them to become part of a school assembly featuring "Marko the Magnificent". The video can always be replayed to help students focus on the important parts. After viewing, ask students to think about how Marko performed his amazing feat. Can anything we have learned about numbers help us? Might we find things out if we carefully record our calculations step-by-step? How is it possible that we can start with different numbers and end up with the same answer?

Suggested Extension Activities & Resources	Once students have seen how Marko does his trick, challenge them to write a number trick of their own, using a scheme similar to Marko's, or one that is different. In these extension activities students will strengthen their understanding of number relationships and arithmetic, causing them to think more deeply about how to develop increasingly complex problems.
Suggested Formative Assessment Probe	Tell students that you are looking for some similar problems that they can create for you. They can choose the numbers and they can choose the story behind them. Ask them to provide a complete solution to the problem, and that you will consider adding it to the next quiz. Use the opportunity to recognize some examples of strong work. Find a couple of examples of weaker work and, without identifying the students, talk about how the weaker problems could be stronger. Students need examples of strong and weak work to do reflection on their contributions. Remember that the purpose of formative assessment is to gather evidence of how students think about the mathematics in order that you can make choices about next steps in instruction. It is critical not to penalize students for incorrect answers in formative situations, but to use the information to better support their further learning.
One Proposed Solution to the Math Mess	Marko asks us to start with any number from one to ten. Since we can start with "any number" let's examine the problem using *x* as a variable. Marko asks us to multiply by 3, which now makes our expression 3x. The next step is critical. We want to add a number that has 3 as a factor. So Marko asks us to add 15 (which is a multiple of 3) and our expression becomes 3x+15. Using distributive property, we can also think of this as 3(X+5). So when we divide by 3, we get x+5, and when we subtract the number we started with – x – we end up with 5. In fact, everyone who did all of the calculations correctly will end up with 5.

Here's another example: Start with any number (x).   Multiply it by 4 (4x)   Add 36 (4x + 36) Divide by 4   (x+9) Add 3 (x+12)

Subtract your original number (x-12-x)   And your answer is 12! Amazing Algebra!