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Javid Validashti* (jvalidas@math.ku.edu), Department of Mathematics, 405 Snow Hall, The University of Kansas, 1460 Jayhawk Blvd., Lawrence, KS 66044. *Relative multiplicities of graded algebras.*

We introduce a sequence of relative multiplicities for a pair $A \subset B$ of standard graded Noetherian algebras over a Noetherian local ring R . These numbers agree with the sequence of relative multiplicities of Simis, Ulrich and Vasconcelos when B_1/A_1 has finite length over R , and unify them with other notions of multiplicity defined by Achilles and Manaresi. We show that our sequence of multiplicities can be used to give numerical criteria for integrality and birationality of the extension $A \subset B$ without any finiteness condition. We also discuss a combinatorial interpretation of these multiplicities for when A and B are arising from Rees algebras of monomial ideals. (Received August 25, 2009)