Abstract Submitted
for the NES16 Meeting of
The American Physical Society

A Unified Mathematical Field Theory DOUGLAS SWEETSER, None — The century old problem of getting gravity to play gracefully with the rest of physics may not have to do with a physics field theory. Instead it may have to do with the math tools used for any physics field theory. By third grade, we had all learned how to add, subtract, multiply, and divide any number. By the end of physics graduate school, the tools of differential geometry no longer allow one such freedom to play with expressions. Here is how one calculates the interval between two events in flat space-time using a metric tensor and a 4-vector: $g_{\mu\nu}de^{\mu}de^{\nu} = dt^2 - (dx^2 + dy^2 + dz^2)/c^2$ This looks like a square. Design an algebra (similar to quaternions) that removes the Greek letters along with the metric tensor: $de^2 = (dt^2 - (dx^2 + dy^2 + dz^2)/c^2, 2dtdx/c, 2dtdy/c, 2dtdz/c)$ The first term is known as the Lorentz invariant interval of special relativity. Two inertial observers will agree to that. This expression has more information than just the interval. The other three terms I call space-times-time. Having two observers agree about space-times-time but disagree about the interval may be the new math for gravity.

Douglas Sweetser
Massachusetts Inst of Tech-MIT

Date submitted: 10 Mar 2016 Electronic form version 1.4