# Why is the unit of torque given as N-m instead of Joule? Isn’t a Joule the same as a N-m?

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When I taught advanced physics, my preference was to use the unit m-N rather than N-m or Joule to emphasize the operation for calculating torque. It is the cross product of a position vector from the hypothetical axis of rotation and the force vector acting on the system at the end of that position vector, **r** x **F**. With cross products order of operation matters. Reversing the order produces the negative of the previous order.

Among other things, units are signals as to what the quality is about. The unit Joule signals energy. Torque is not energy, as it is a type of vector, and energy is a scaler. I use the unit N-m for work, but I'm not picky about whether N-m or Joule is used for energy. Work produces changes (really exchanges between systems) in energy and is equal to the energy exchanged.

Work, energy and torque are all different quantities, and using different unit expressions for them improves clarity.

BTW, when work is done by forces, the work is calculated as the integral of force with respect to a vector representing infinitesimal displacements. When work is done by torques, the work is calculated as the integral of torques with respect to infinitesimal changes in angle. Since angles are ratios in which units more or less disappear, the unit for torque must mathematically be the same as the unit of work and energy.