

Does it bother you that the m in $F=ma$ and the m in $F=GMm/r^2$ are the same thing? Discuss.

No.

Another way to look at it is that $a=GM/r^2$.

Both equations are fully true.

When we say $F = ma$ we are in fact saying $F=GMm/r^2$ in a shorthanded fashion. We know that $a = 9.8 \text{ m/s}^2$ ON EARTH.... So the long way answer is no, because these are in fact two ways of writing the same expression.

No, this does not bother me. 8 hours later, it still does not bother me. It bothers me somewhat, that it doesn't bother me. If there is anything bothersome in those equations, I must be too used to them, plus I have always taken them for granted. The equations define acceleration of a mass caused by another mass as $a=GM/r^2$. That looks perfectly fine.

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Slightly. It appears to be a bit of a coincidence that the proportionality constant in Newton's Second Law appears in the Universal Law of Gravitation. There is no physical reason behind that. There is no reason why those two laws have to be related. It is just how the Universe was constructed.

Yes. It seems like much too convenient of a coincidence for the two to be the same thing. As far as I know, there is nothing in physics that says that the two should be the same. That would indicate that our physics system doesn't yet fully connect gravity to the rest of physics.

Kind of. It means that gravitation and acceleration are the same thing if you cancel out the m 's, and that the mass doesn't matter for the gravitational acceleration as it would for the acceleration from the electrical force.

Does it bother you that the m in $F=ma$ and the m in $F=GMm/r^2$ are the same thing? Discuss.

It does not bother me at all. Should it?

It just tells me that inertia is gravity...

