The car's speed, 1000m/s, is slow enough compared to c that we don't need relativity to figure out its momentum.

The momentum is then p=(1000m/s)(2000kg). It is useful to convert this to mass units by dividing by c:

$$p/c = 6.67g$$

This is the momentum the bullet had before it struck the car, by momentum conservation.

The energy of the car has increased in two ways: it is now heavier (by 8.33 g the question tell us) and has some kinetic energy. The kinetic energy can again be computed using the non-relativistic formula:

K.E. = $(2000kg)(1000m/s)^2 / 2 = 10^9$ J

The rest-mass-energy has increased by $(8.33g)c^2 = 7.5\ 10^{14}$ J

Essencialy all of the bullet's energy has gone into mass energy of the car, the KE is negligible. Therefore, the total energy of the bullet was, in units of mass again

$$E/c^2 = 8.33g$$

Now use $m^2 = \frac{E^2}{c^4} - \frac{p^2}{c^2}$

$$m = \sqrt{8.33^2 - 6.67^2} = 5g$$

How fast was the bullet going? Look at the momentum:

$$\frac{p}{c} = 6.67g = m\frac{v}{c}\gamma = (5g)\frac{v/c}{\sqrt{1-(v/c)^2}}$$

SOLVE FOR v/c, $v = 0.8c$

We can now perform a consistency check by computing the energy of the bullet:

$$E/c^2 = m\gamma = 5g\left(\frac{5}{3}\right) = 8.33g$$

Notice how different this is from the way we think of non-relativistic collisions. If this was a non-relativistic collision, we would have assumed that momentum is conserved but energy is not (inelastic collision). The extra energy would have been dissipated (as heat and deformation energy). In relativity, energy is ALWAYS conserved. The extra energy might go into heat and other stuff, but it manifests itself as extra mass. So, the car gained the actual weight of the bullet (5g) plus the

If the ratio of masses had been less extreme, the of the car would have been much greater and we would have had to use relativistic formulas for car. Try the following question: the same bullet, moving with speed 0.8c and with same mass 5g strikes a motionless toy car weighting 50g. What is the speed of the toy car after the bullet wedges in it and how much mass does it have?