

SHORT HW 1: Units

COURSE: Physics 165, *Introduction to Particle Physics* (2020)
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1 Natural Units

In natural units,

$$\begin{aligned}\hbar &= 1.054 \times 10^{-34} \text{J s} & c &= 2.998 \times 10^8 \text{m s}^{-1} \\ &= 6.582 \times 10^{-22} \text{MeV s} & &\equiv 1 . \\ &\equiv 1\end{aligned}$$

Do everything in this problem to *one significant figure*. **[Flip: Update, 1/16 6:19 AM: Corrected value of \hbar in J s; thanks Bryant P.]**

1.1 The mass of a proton in kilograms

The mass of a proton is 938 MeV. Write the proton mass in kilograms.

1.2 Human weight in protons

The average American weighs¹ 81 kg. Round this to a single significant figure: 100 kg. What is this mass in natural units (GeV).

Approximately how many protons have the same mass as a human being?

¹“The weight of nations,” <http://doi.org/10.1186/1471-2458-12-439>