One of the pathways for hydrogen fusion involves the following reaction:

$$^{2}\mathrm{H} +^{3} \mathrm{H} \rightarrow^{4} \mathrm{He} + +^{1}_{0}\mathrm{n} \tag{1}$$

1. How much kinetic energy does a deuterium nucleus need to fuse with a tritium nucleus? *Note: for a course-grained approximation, you may assume that the tritium is fixed in position and the deuterium speeds toward it.*

2. If the deuterium is in a gas, what temperature should the gas be so that most deuterium has enough kinetic energy for fusion?

3. **Extra** Based on the masses of deuterium (^{2}H) and tritium (^{3}H), and given that one neutron will be produced, how much energy will be generated when they fuse?

isotope	mass
^{2}H	2.0141 u
^{3}H	3.01605 u
^{4}He	4.0260 u
$^{1}_{0}$n	1.0087 u

4. **Extra** What mass of deuterium + tritium would need to be fused to provide the electrical power the United States uses in a day?[1]

[1]The electrical power use of the US is about 10^{12} J/s.