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**Research Task 2:** Of course we have ignored some important additional effects in the process of formation of stars – metallicity, rotation, magnetic fields, binarity. Choose at least one of these physical characteristics and discuss how it might affect the formation of a star.

**Order of Magnitude Estimate 2:** a globular cluster comprises many tens to hundreds of thousands of stars. As they orbit in the galaxy, they are sometimes torn apart by the galaxy's tidal forces. Assuming the same orbits, which will survive longer: a  $10^5 M_{\text{sun}}$  cluster of radius 10pc, or one with a radius of 1pc? What would happen if the second one had a mass instead of  $10^4 M_{\text{sun}}$ ?

**Research Task 3:** There is strong evidence for 'solar-sized' black holes. What is the best evidence for these black holes and what is the range of postulated masses?

The masses of the black holes that merged to emit the gravity waves detected by LIGO were 29 and 35 solar masses. Comment on how this discovery fits with what we already know about BH masses.

**Conclusions:** In your conclusions please consider how the black holes seen by LIGO might have formed. Although you have not done a full suite of calculations, (I am not expecting a treatise!) you should have a few ideas about what the issues might be in forming this pair of black holes. How likely do you think they might be?

**Order-of-Magnitude Calculation 3:** Roughly how far must you look in a particular direction before your line-of-sight intersects with a galaxy?

**Order-of-Magnitude Calculation 4:** Can you estimate the temperature at which the core of a star starts nuclear fusion?