picture [1 mark]

hydrostatic equilibrium is balance between gravity pulling in a pressure of hot gas pushing out. [1 mark]

bigger mass, so more gravity, so need more pressure, so core has higher temperature needed for hydrostatic equilibrium. get MUCH higher fusion rate so MUCH more luminous [1 mark]

use doppler shift of stellar absorption lines. [1 mark]

Maximum size of shift gives orbital velocity and mass ratio of the two stars, while period gives orbital separation. This gives everything we need to get mass for both [1 mark]

white dwarfs - mass of sun in size of earth. held up by electron degeneracy pressure form from end of stellar evolution of low mass stars (less than 6 solar masses) [1 mark]

neutron stars - held up by neutron degeneracy pressure. neutrons heavier than electrons so can fit into a much smaller box. mass of sun into size of London. form from heavier stars 6-15x mass of sun, where gravity is able to overcome degeneracy pressure of electrons - supernova explosion. [1 mark]

black holes. form from even heavier stars (more than 15x the mass of the sun) where gravitional collapse cannot be stopped even by neutron degeneracy pressure. mass of sun, size of newcastle. [1 mark]

white dwarfs. Sirius B or other white dwarf binaries. can see directly that they are very dim, so small area, while measure mass from binary orbit. Or see from accretion [1 mark]

neutron stars - pulsars! magnetic field misaligned with rotation axis, so get beams of radio emission. Or see from accretion. black holes - see from accretion and mass determined from orbit too big to be a neutron star. [1 mark]