Teacher notes
Topic E

Stellar equilibrium.

The guide refers to the equilibrium of a star as a balance between the inward gravitational pressure that tends to contract the star and the outward "radiation pressure". The term radiation pressure refers to the pressure exerted by photons but there is an additional gas pressure like the pressure of an ideal gas that we studied in Topic B. Both radiation and gas pressures are present. For low mass stars, gas pressure is dominant. Radiation pressure becomes important only for the very massive stars.

We define the ratio $\beta = \frac{P_{\text{gas}}}{P_{\text{total}}}$.

Mass/$M_\odot$	β
1	0.999
17	0.900
120	0.500

So, we see that gas pressure is dominant for most stars. Radiation and gas pressures become equally important only for the largest known stars.