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A map of the stars

Activity 1 answer sheet

a) Why do most stars fall along a single curved band, called the 'main sequence' instead of being scattered randomly?

Most stars we observe are in the long, stable phase of their life cycle where they fuse hydrogen in their cores – the main-sequence phase. Because this stage lasts billions of years, it is statistically the phase in which we are most likely to observe stars.
In this phase, a star's temperature and brightness depend mainly on its mass, so stars line up in a predictable pattern instead of being scattered randomly.

b) What might this suggest about how stars live and evolve?

This suggests that a star's life and evolution are largely determined by the mass it accumulates during formation. Mass determines how hot and bright a star becomes on the main sequence, how fast it burns its fuel, and how it moves across the H-R diagram as it ages. Stars spend most of their lives on the main sequence, and after exhausting their hydrogen, they evolve from red giants to later become white dwarfs. Because stars with similar masses evolve in comparable ways, the main sequence forms a well-defined band, revealing predictable stages of stellar life.