This document contains two specific examples that relate to future research in the field of Astrophysics, which I studied leading up to the HSC exam. It is critical to have knowledge of current developments and research in Astrophysics, which may find place within a HSC exam response!

Future Research in Astrophysics – Examples!

SKA → Square Kilometre Array:

The Square Kilometre Array (SKA) is the next generation radio telescope that has a discovery potential 10, 000 times greater than the best present-day instruments i.e. the larger area of the arrays being developed will significantly increase resolution and sensitivity. It is Australian and will give Astronomers remarkable insights into the formation of the early Universe and the emergence of the 1st stars, galaxies and other astronomical structures. The designing of this telescope requires technological developments in computing, communications and radio frequency devices.

Planned Missions for Ska:

1. **Cradle of Life → this project will explore whether there are Earth-like planets around other stars, and whether they host intelligent life, thus helping to answer the eternal question of whether there is life elsewhere in the Universe.**
2. **Probing the Dark Ages → this will explore the 1st black holes and stars, and help answer the question of what happened immediately after the Big Bang and before the formation of the 1st stars and galaxies.**
3. **The Origin and Evolution of Cosmic Magnetism → this will explore how magnetism affects the formation of stars and galaxies, and what maintains the present-day magnetic fields of galaxies, stars and planets.**

OWL → Overwhelmingly Large Telescope:

The Overwhelmingly Large Telescope is a conceptual design by the European Southern Observatory (ESO) organisation for an extremely large telescope with an intended single aperture of 100m in diameter. This would have exceptional light-gathering and imaging capacity which would greatly increase the depth to which the Universe can be explored. The OWL is expected to see astronomical objects with an apparent magnitude of 38 → 1500 times fainter than the faintest object detected by Hubble Space Telescope. As such, it will help in the exploration of extra-solar planets and extra-terrestrial life (as it can use spectral analysis to analyse the spectrums from planets, which indicates the presences of molecules that are indicative of life → i.e. can determine their atmosphere's composition and hence reveal existence of biospheres). It will also be able to peer into the deepest reaches of the Universe and witness the birth of the very first stars and galaxies → enhancing our understanding of the Universe.