

- 15 GN-z11 is one of the most distant observed galaxies in the universe. A red shift z of 10.96 has been detected by the Hubble Space Telescope (HST) for radiation from this galaxy.

(a) Radiation with a wavelength of 134 nm was emitted from GN-z11.

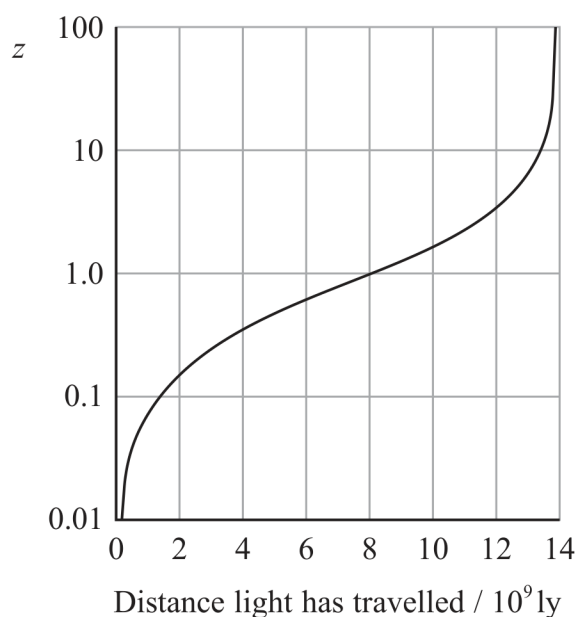
Calculate the wavelength λ_o of this radiation when it is detected at the HST.

(2)

$\lambda_o = \dots\dots\dots$

- (b) The graph shows how z , for light emitted from a galaxy, varies with the distance the light has travelled in reaching the Earth.

A light year (ly) is the distance travelled by light in 1 year.



Determine the distance light from GN-z11 has travelled in reaching the Earth, in metres.

$$1 \text{ year} = 3.15 \times 10^7 \text{ s}$$

(3)

Distance the light has travelled = m

- (c) The recently launched James Webb Space Telescope is designed to operate in the infrared region of the spectrum.

Explain why this will be helpful for studying very distant galaxies.

(2)

(Total for Question 15 = 7 marks)

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