

19 The astronomer Hertzsprung used parallax to determine the distances to some of the variable stars known as Cepheids.

- (a) Using parallax measurements, astronomers can determine distances to all stars with a parallax angle larger than 2.4×10^{-7} rad.

The variable star Alpha Cephei is 4.6×10^{17} m from the Earth.

Deduce whether the distance to Alpha Cephei could be determined from parallax measurements.

distance from Earth to Sun = 1.5×10^{11} m

(3)

- (b) Cepheids are a type of standard candle.

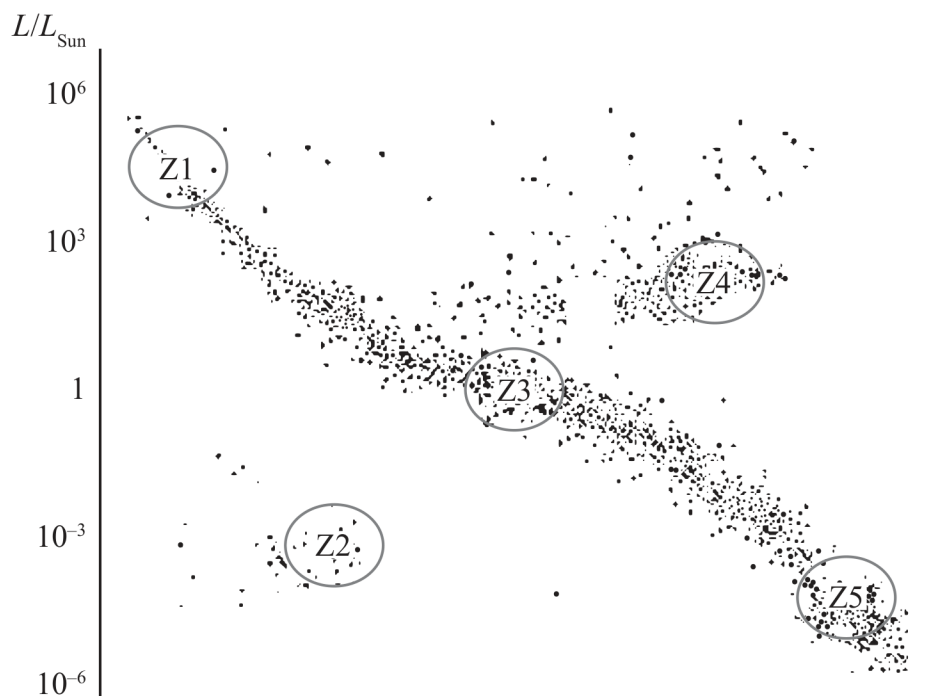
Describe how standard candles can be used to determine distances to stars.

(3)



- (c) The Sun is a yellow star with a surface temperature of about 6000 K. In the 20th century, astronomers discovered a large variety of stars in our galaxy. Hertzsprung and Russell developed the Hertzsprung-Russell (HR) diagram as a way of classifying stars.

An HR diagram is shown below.



- (i) Label the x-axis of the HR diagram. You should include approximate values. (3)
- (ii) There are five zones, Z1, Z2, Z3, Z4 and Z5, identified on the HR diagram.

Complete the following table. You should match one zone with each description. (3)

Description	Zone
High mass hot stars	
Low mass cool stars	
Low mass hot stars	



*(iii) The position of a star on the HR diagram changes as the star evolves.

Explain how a star like the Sun evolves as it progresses from zone Z3 to its final position on the HR diagram.

(6)

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(Total for Question 19 = 18 marks)