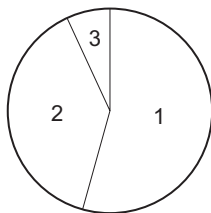


37 The Sun radiates most of its energy in three regions of the electromagnetic spectrum.

In the pie chart, region 1 is infrared radiation and region 2 is visible radiation.



What is region 3?

- A** microwave
- B** radio
- C** ultraviolet
- D** X-ray

39 Nuclear reactions in the Sun release large quantities of energy.

Which statement about this process is correct?

- A** It involves the fission of helium to produce hydrogen.
- B** It involves the fission of hydrogen to produce helium.
- C** It involves the fusion of helium to produce hydrogen.
- D** It involves the fusion of hydrogen to produce helium.

11 (a) State the condition required for a protostar to become a stable star.

.....

 [1]

(b) (i) Define the Hubble constant.

.....

 [2]

(ii) The current estimate for the Hubble constant is 2.2×10^{-18} per second.

State the equation which gives an estimate for the age of the Universe.

..... [1]

(iii) Calculate an estimate for the age of the Universe.

estimate of age = s [1]

[Total: 5]

39 The energy generated in stable stars comes from nuclear reactions.

Which type of reaction occurs in the Sun?

- A** Helium nuclei break up to give hydrogen nuclei.
- B** Helium nuclei join together to form hydrogen nuclei.
- C** Hydrogen nuclei break up to give helium nuclei.
- D** Hydrogen nuclei join together to form helium nuclei.

- 10 (a)** The time taken for Mars to orbit the Sun is 690 Earth days. The average orbital radius of Mars is 2.28×10^8 km. An Earth day is 24 h.

Calculate the average orbital speed of Mars in km/s.

average speed = [3]

- (b)** State the shape of the orbits of the planets.

..... [1]

- (c)** Light from a distant galaxy is redshifted.

- (i)** Explain what is meant by redshift.

.....

..... [2]

- (ii)** State the quantity that the redshift of a galaxy is used to calculate.

..... [1]

[Total: 7]