

9 (a) Cosmic microwave background radiation (CMBR) can be observed in every direction in space around us.

(i) State when CMBR was produced.

..... [1]

(ii) State and explain how the wavelength of this radiation has changed since it was formed.

.....
.....
..... [2]

(b) Table 9.1 shows data about planets in our solar system.

Table 9.1

planet	average radius of orbit around the Sun / 10^6 km	time for one orbit / Earth years	average surface temperature / $^{\circ}\text{C}$
Venus	108	0.62	460
Earth	150	1.00	15
Mars	228	1.90	-65
Jupiter	778	12.00	-110
Saturn	1430	29.00	-140

(i) The orbit of Venus is approximately circular.

Calculate the average orbital speed v of Venus. Give your answer in km/h.

orbital speed = km/h [3]

(ii) State how the average surface temperature of a planet changes as its distance from the Sun increases.

..... [1]

[Total: 7]