12 Solar panels generate electricity when sunlight is incident on the surface of the panel.

(a) The total generation of electricity worldwide in the year 2014 was approximately 23 800 TWh (1 TWh = 3.6×10^{15} J).

Some scientists claim that if the Sahara Desert were covered with solar panels, sufficient electricity could be generated to supply the whole world.

(i) Calculate the maximum energy received by the solar panels in one hour.

maximum intensity of solar radiation at the Earth's surface = 1100 Wm^{-2}
area of Sahara Desert = 9.2×10^{12} m^2

(2)

Maximum energy received in one hour = ...

(ii) Determine whether covering the Sahara Desert with solar panels would be able to generate enough electricity for the whole world.

(2)

(b) Sand storms are common in the Sahara Desert.

Explain why sand storms reduce the power generated by the solar panels.

(2)

(Total for Question 12 = 6 marks)