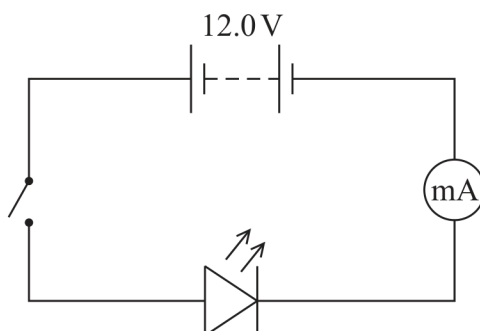


17 A red light-emitting diode (LED) was placed into a circuit, as shown.



The LED emits light of wavelength of 627 nm and may be assumed to be 100% efficient. The battery has negligible internal resistance.

When the switch was closed, the reading on the ammeter was 9.2 mA.

(a) (i) Show that the power of the LED was about 0.1 W.

(2)

(ii) Calculate the number of photons emitted by the LED in one minute.

(4)

Number of photons emitted in one minute =



- (b) The red LED was replaced with a green LED which emits light with a shorter wavelength than the red LED. The current in the circuit did not change.

Explain how replacing the LED affected the number of photons emitted in one minute.

(2)

- (c) The maximum intensity of sunlight at the Earth's surface is about 1100 W m^{-2} .

A student suggests that the intensity of light at a distance of 5.0 mm from an LED with a power of 0.69 W is greater than the intensity of sunlight at the Earth's surface.

Assess whether the student's suggestion is correct.

(3)