

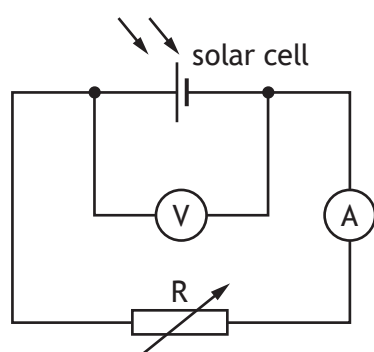
14. Solar cells are made by joining n-type and p-type semiconductor materials. A layer is formed at the junction between the materials.

- (a) A potential difference is produced when photons enter the layer between the p-type and n-type materials.

State the name of this effect.

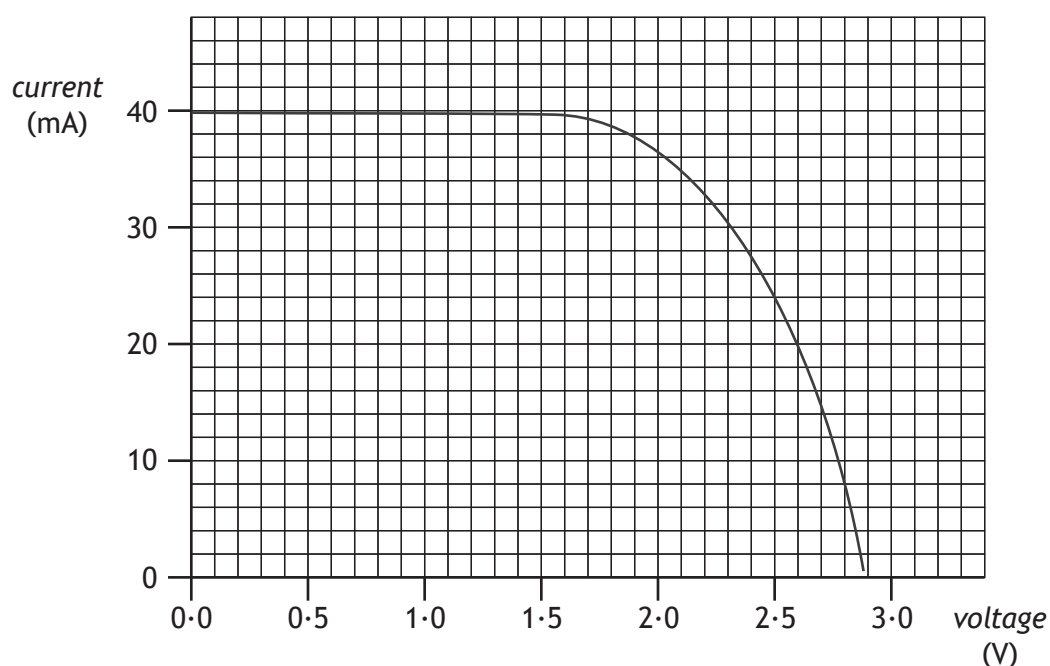
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- (b) A student carries out an experiment using a solar cell connected to a variable resistor  $R$  as shown.



A lamp is placed above the solar cell and switched on.

The variable resistor is altered and readings of current and voltage are taken. These readings are used to produce the following graph.



14. (b) (continued)

- (i) Solar cells have a maximum power output for a particular irradiance of light.

In this experiment, the maximum power output occurs when the voltage is 2.1 V.

Use information from the graph to estimate a value for the maximum power output from the solar cell.

3

*Space for working and answer*

- (ii) The lamp is now moved closer to the solar cell.

Explain, in terms of photons, why the maximum output power from the solar cell increases.

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