Oxford Cambridge and RSA

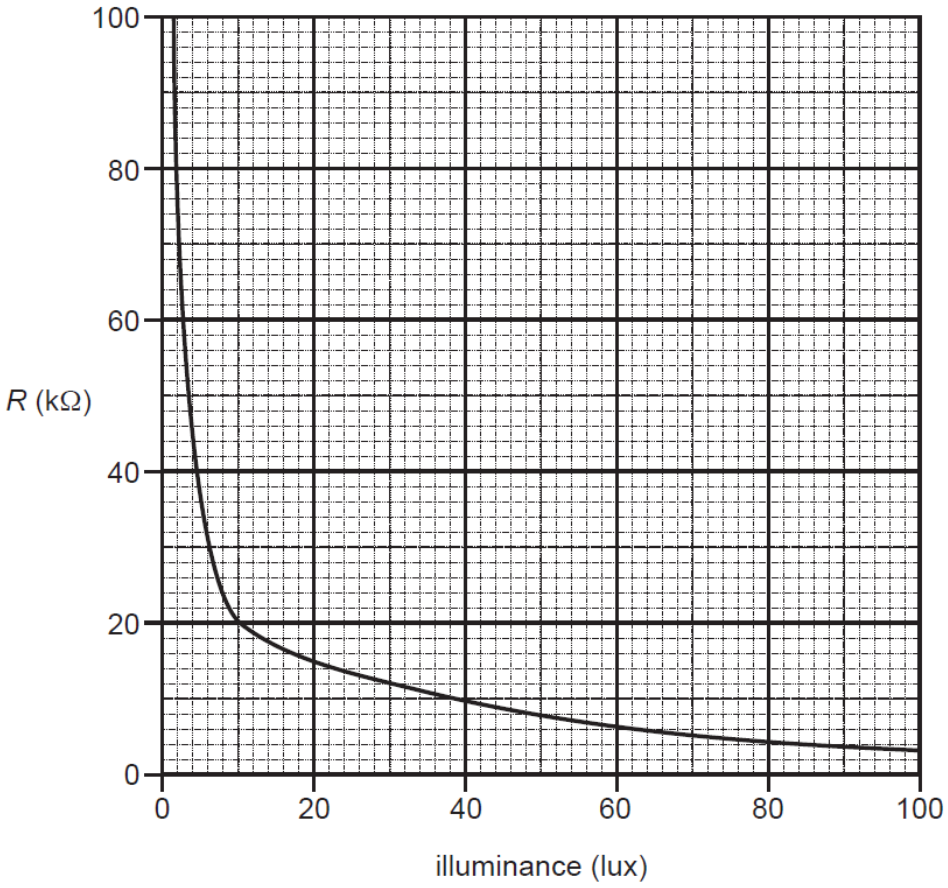
GCSE Physics B (Twenty First Century Science)

J259/02 Depth in physics (Foundation Tier)

Question Set 8

1 This question is about using an LDR (light-dependent resistor) to measure light intensity.

(a) The resistance *R* of an LDR varies with illuminance (the amount of light energy per unit area hitting a surface) as shown in the graph.



(i) Which of the following statements correctly describes this variation?

Tick (✓) **one** box.

The resistance is directly proportional to the illuminance. ☐

The resistance and the illuminance have a positive correlation. ☐

As the illuminance increases, the change in resistance becomes less and less. ☑

The resistance is greater at 80 lux than at 20 lux. ☐

[1]

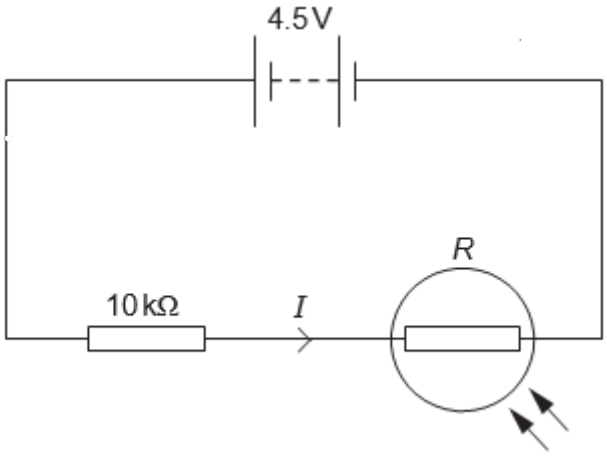
(ii) Use the graph to estimate the change in resistance of the LDR when the illuminance increases from 10 lux to 70 lux.

$20 - 5 = 15\,k\Omega$

Change in resistance = ... 15 ..... kΩ **[2]**

(b) The LDR is connected in series with a fixed resistor of resistance 10 kΩ and a 4.5 V battery.

The **total** resistance at 30 lux is 22 000 Ω.



(i) Calculate the current in the circuit.

$I = \frac{V}{R} = \frac{4.5}{22,000} = 2.05 \times 10^{-4}\,A$

Current = ... 2.05×10^{-4} ..... A **[3]**

(ii) Calculate the potential difference across the fixed 10 kΩ resistor when the illuminance is 30 lux.

$V = 4.5 \times \frac{10,000}{22,000} = 2.05\,V$

Potential difference = ... 2.05 ..... V **[3]**

(iii) Describe, without any calculations, how the potential difference across the fixed resistor will change when the illuminance increases from 30 lux to 100 lux. **[3]**

As illuminance increases, resistance of the LDR decreases so potential difference across the fixed resistor increases.

Total Marks for Question Set 8: 12