

- 5 (a) Two circuits are set up using the light dependent resistor LDR in Fig. 5.1(a) and Fig. 5.1(b).

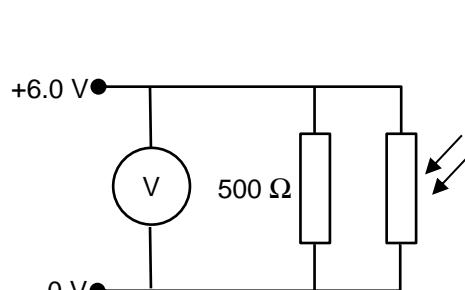


Fig. 5.1(a)

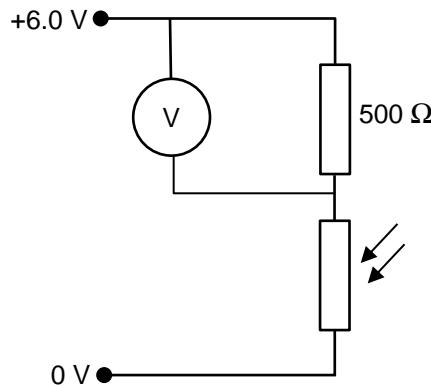


Fig. 5.1(b)

- (i) For the circuit to function as a light meter, the voltmeter reading  $V$  must increase as the light intensity increases.

Explain why only the circuit in Fig. 5.1(b) can fulfil this function.

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 ..... [3]

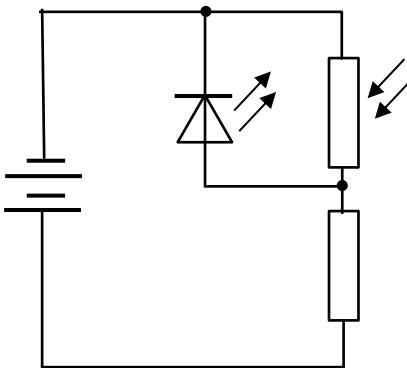
- (ii) Calculate the resistance of the LDR when  $V = 3.75$  V for the circuit in Fig. 5.1(b).

resistance of LDR = .....  $\Omega$  [2]

[Turn over]

- (b)** The light-emitting diode, LED, is a semiconductor light source that emits light when current flows through it.

Fig. 5.2 shows a circuit designed by a student.



**Fig. 5.2**

The LED is very close to and facing the LDR. The circuit is taken into a dark room.

- (i)** The student thought that the LED would switch on.

Instead the LED was found to repeatedly switch on and off.

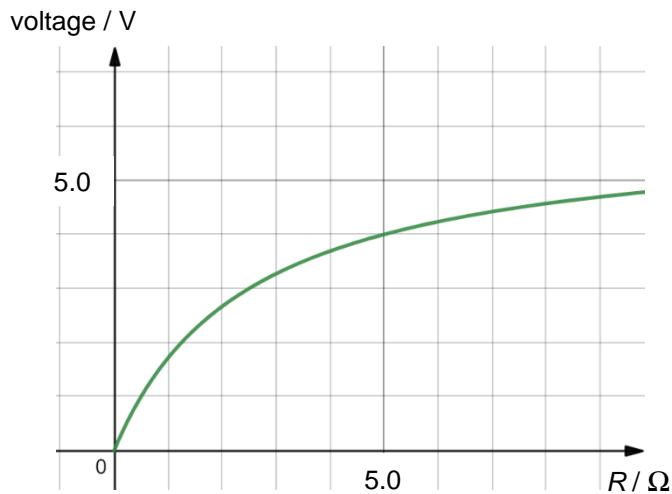
Explain this behaviour of the LED in the circuit.

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 ..... [2]

- (ii)** Suggest a possible refinement so that the LED switches on permanently when taken into the dark room.

.....  
 .....  
 ..... [1]

- (c) A variable resistor is connected directly across the terminals of a cell with an e.m.f. of 6.0 V. A voltmeter is connected across the variable resistor and Fig. 5.3 is obtained as the resistance of the variable resistor  $R$  changes.

**Fig. 5.3**

- (i) On Fig. 5.3, draw the graph representing the variation in the voltmeter reading if the cell was ideal with no internal resistance. Label the graph **N**. [1]
- (ii) Using Fig. 5.3, estimate the internal resistance of the cell.

internal resistance = .....  $\Omega$  [2]

[Total: 11]

[Turn over]