

5 A student has some LEDs connected in a circuit. They emit light of different colours.

(a) (i) The different colours of light are waves which must have

(1)

- ☐ **A** the same amplitude in free space
- ☐ **B** the same frequency in free space
- ☐ **C** the same speed in free space
- ☐ **D** the same wavelength in free space

(ii) When an LED is on, it shows that

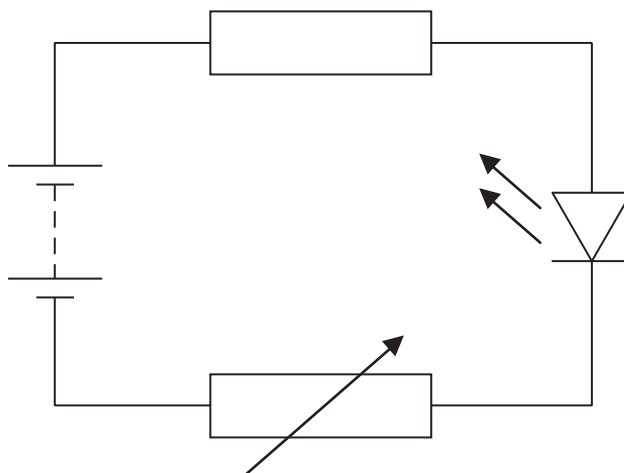
(1)

- ☐ **A** there must be alternating current in the circuit
- ☐ **B** there must be a current in the circuit
- ☐ **C** there is a fault in the LED
- ☐ **D** a fuse has blown



(b) An LED needs a minimum voltage to make it emit light.

The student investigates this minimum voltage using the circuit shown.



(i) The student uses a voltmeter to measure the voltage across the LED.

Add this voltmeter to the circuit diagram.

(2)

(ii) The student gradually increases the voltage across the LED and records the minimum voltage at which the LED emits light.

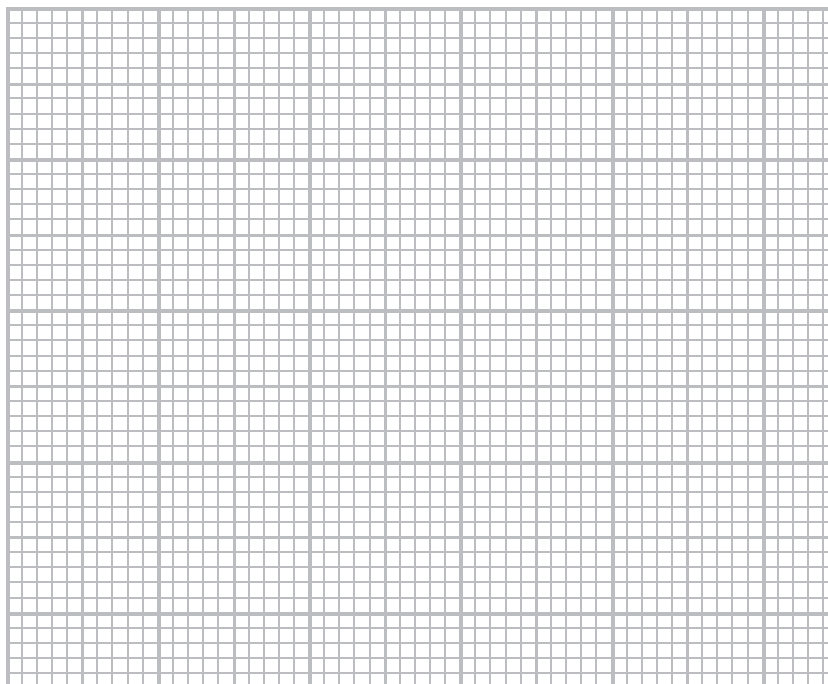
The results for some different LEDs are shown in the table.

Colour of light from LED	Minimum voltage in V
Red	1.7
Blue	3.6
Yellow	2.1
Orange	2.0
Green	3.0



Display the results of the student's investigation on the grid.

(4)



(iii) The student concludes:



The minimum voltage depends on the wavelength of the light emitted.

Evaluate the student's conclusion.

(2)

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(Total for Question 5 = 10 marks)

