

| Question number | | Answer | Notes | Marks | | | | | | | | | | | | | |
|--------------------------|----------------------|--------|--|---|----------------------|-----|-----|------|-----|--------|-----|--------|-----|-------|-----|---|---|
| 5 | (a) | (i) | C (the same speed in free space) | 1 | | | | | | | | | | | | | |
| | | (ii) | B (there must be a current in the circuit) | 1 | | | | | | | | | | | | | |
| | (b) | (i) | Voltmeter connected in parallel with any circuit component; Component chosen is the LED ; | 2 | | | | | | | | | | | | | |
| | | (ii) | Axes labelled- quantity and unit ; Linear scale such that longest bar occupies at least half the grid; Plotting--- ignore order of bars 5 bars correctly plotted;; If only 3 bars correctly plotted allow 1 mark for plotting <table><tr><th>Colour of light from LED</th><th>Minimum voltage in V</th></tr><tr><td>Red</td><td>1.7</td></tr><tr><td>Blue</td><td>3.6</td></tr><tr><td>Yellow</td><td>2.1</td></tr><tr><td>Orange</td><td>2.0</td></tr><tr><td>Green</td><td>3.0</td></tr></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 | voltage in V (or V/V) AND all bars (or points) labelled Ignore orientation Allow non-zero origin Bar length plotted to nearest ½ small square ALL data plotted correctly as floating “x’s” gets only one mark for plotting Reject both plotting marks if a line graph is drawn (only scale and axes marks are available in this case) | 4 |
| Colour of light from LED | Minimum voltage in V | | | | | | | | | | | | | | | | |
| Red | 1.7 | | | | | | | | | | | | | | | | |
| Blue | 3.6 | | | | | | | | | | | | | | | | |
| Yellow | 2.1 | | | | | | | | | | | | | | | | |
| Orange | 2.0 | | | | | | | | | | | | | | | | |
| Green | 3.0 | | | | | | | | | | | | | | | | |
| | | (iii) | Student is right/wrong - no mark Any two of MP1 idea that the visible spectrum is a sequence, with the end colours identified; MP2 Colour correctly related to wavelength (e.g. red has longest wavelength); MP3 Colour correctly related to voltage (e.g. blue needs highest voltage); | Red to blue (start either end) Allow ROYGBIV etc Wavelength (or frequency) correctly related to voltage = 2 marks, e.g. f increases with V λ increases with 1/V | 2 | | | | | | | | | | | | |