

Series and parallel circuit patterns

Grade 7 science (Year 8 · Class 7) · Lab answers

Model answers based on the sample data. Your own numbers will differ because bulbs and cells vary, but the pattern should be the same: strong dimming in series and almost no dimming in parallel. Use the sample percentages to check your method.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS2-3

Question 1 Describe the pattern

In series the brightness of each bulb falls sharply as more bulbs are added (480, 45, 9 lux). In parallel it stays almost the same (480, 472, 466 lux). **Series dims, parallel does not.**

Question 2 Series percentages

Two bulbs: $45 \div 480 \times 100 = 9.4 \%$.

Three bulbs: $9 \div 480 \times 100 = 1.9 \%$.

Question 3 Parallel percentages

Two bulbs: $472 \div 480 \times 100 = 98.3 \%$.

Three bulbs: $466 \div 480 \times 100 = 97.1 \%$.

Question 4 Explaining series

In series the same cells must push charge through every bulb, so the supply voltage is shared. Each bulb gets a smaller share of the energy, so it is dimmer. **Energy is shared.**

Question 5 A small drop in parallel

The cells must supply more current for more bulbs, and real cells cannot keep their voltage perfectly under a bigger load. **The voltage across each bulb is slightly lower.**

Question 6 Cell life

Series with three bulbs draws the smallest current, so the cells last longest. A single bulb is in the middle. Three bulbs in parallel draw about three times the current, so the cells last about one third as long. **Parallel drains cells fastest.**

Question 7 Reliability

Hold the light meter at exactly the same distance each time, use a shield tube and a dim

room, and repeat readings to take a mean. **Same distance, dim room, repeats.**

Question 8 Unscrewing a bulb

In series: **all the other bulbs go out** because the loop is broken.

In parallel: **the other bulbs stay lit** with the same brightness.