

Reading ammeters and voltmeters in circuits

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

Model answers based on the sample data. Your own readings will differ a little because bulbs, cells and meters vary, but your totals should agree with the rules to within about 0.02 A and 0.1 V. Use the model working to check your method.

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

Question 1 Series current

The readings are 0.19 A, 0.19 A and 0.18 A. The 0.01 A difference is within the reading uncertainty of the meters, so **the current is the same everywhere in the loop.**

Question 2 Series voltage

$$1.5 \text{ V} + 1.4 \text{ V} = \mathbf{2.9 \text{ V.}}$$

This equals the voltage across the cells, so the supply voltage is shared between the bulbs.

Question 3 Parallel current

$$0.32 \text{ A} + 0.31 \text{ A} = \mathbf{0.63 \text{ A.}}$$

This equals the main current, so the branch currents add up to the main current.

Question 4 Parallel voltage

Both bulbs have **2.9 V**, the same as the cells. Each bulb is connected straight across the cells, so each has the full supply voltage.

Question 5 Converting units

$$\text{Main: } 0.63 \times 1000 = \mathbf{630 \text{ mA.}}$$

$$\text{Branch 1: } 0.32 \times 1000 = \mathbf{320 \text{ mA.}}$$

Question 6 A third bulb

A third bulb would draw about another 0.32 A, so the main current would be about $0.63 \text{ A} + 0.32 \text{ A} = \mathbf{0.95 \text{ A.}}$

Question 7 Meter placement

All of the current being measured must pass through the ammeter, so it must be in the loop. An ammeter across a bulb gives the current an almost resistance-free path, so the bulb goes

out and the ammeter or cells could be damaged. **Series only.**

Question 8 Evaluation

The meters have a small reading uncertainty (± 0.01 A), and the bulbs may warm up and change the current slightly during the measurement. Improve by repeating the readings, using the same meter in each position, and taking a mean. **Repeat and use one meter.**