

Resistance and how Ohm linked v , i and r

Grade 8 science (Year 9 · Class 8) · Lab answers

Model answers use the sample data. Your own readings will differ slightly, but the straight line for the resistor and the curved line for the lamp should appear in your results too.

Level: Grade 8 science (Year 9 · Class 8) · **Curriculum:** MS-PS2-3

Question 1 Resistor values

$R = 1.4 \div 0.09 = 15.6$; $2.9 \div 0.19 = 15.3$; $4.4 \div 0.29 = 15.2$; $5.8 \div 0.38 = 15.3$. Values to 3 significant figures: 15.6, 15.3, 15.2 and 15.3 Ω . Mean = **15.3 Ω** , which agrees with the stated 15 Ω .

Question 2 Ohmic?

The points lie on a **straight line through the origin**, because $V \div I$ is almost constant. The resistor is ohmic.

Question 3 Gradient

Gradient = $0.38 \div 5.8 = 0.0655$ A/V. $R = 1 \div 0.0655 =$ **15.3 Ω** .

Question 4 Lamp resistances

$0.5 \div 0.10 = 5.0$; $1.0 \div 0.16 = 6.25$; $1.5 \div 0.20 = 7.5$; $2.0 \div 0.23 = 8.7$; $2.5 \div 0.25 = 10$.
5.0, 6.3, 7.5, 8.7 and 10 Ω .

Question 5 Explain the lamp

The filament gets hotter as the current rises, so its atoms vibrate more and collide more with the moving charges, raising R from 5.0 Ω to 10 Ω . The lamp graph is a **curve that bends over**, unlike the straight line of the resistor.

Question 6 Uncertainty

$0.01 \div 0.09 \times 100 =$ **11 %**. Larger currents have a smaller percentage uncertainty.

Question 7 Stronger evidence

Take more readings between 0 and 6 V, repeat each three times and average, and check the meters for zero error. Opening the switch between readings also stops heating. **More points and repeats** make the line more reliable.