

Energy forms, changes and sources

Grade 6 science (Year 7 · Class 6) · Lab answers

The sample data show a much larger temperature rise near the filament lamp, which means it gives out far more thermal energy. Compare your own readings with these answers and check your graph shapes and calculations.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS3

Question 1 Temperature rise

Filament: $41.0 - 24.0 = 17.0$ °C. LED: $25.5 - 24.0 = 1.5$ °C.

Question 2 Rate of heating

Filament: $29.5 - 24.0 = 5.5$ °C/min. LED: $24.4 - 24.0 = 0.4$ °C/min.

Question 3 Graph

The filament curve rises steeply and then flattens; the LED curve rises very gently. The curve flattens because the thermometer loses thermal energy to the air as fast as it gains it, so the temperature **levels off**.

Question 4 Comparison

$17.0 \div 1.5 = 11.3$, so the filament rise is about **11 times greater**.

Question 5 Conclusion

Both lamps gave similar light, but the filament lamp gave out much more thermal energy, so it transforms a larger share of its electrical energy into **wasted thermal energy**. The LED lamp is more efficient.

Question 6 Fair test

Keep the **distance from lamp to thermometer** (2 cm), the **starting temperature** and the **time of heating** the same, and use similar thermometers and the same room position.

Question 7 Uncertainty

LED: $0.5 \div 1.5 \times 100 = 33$ %. Filament: $0.5 \div 17.0 \times 100 = 2.9$ %. The filament result is more reliable because its uncertainty is much smaller.