Meter-reading answer key

Questions correspond to the printable meter-reading worksheet. Accept equivalent units and well-supported explanations.

1. Convert 118.3 mA to amperes.

0.1183 A

2. Convert 4.70 kΩ to ohms.

4,700 Ω

3. Convert 1.200 MΩ to ohms.

1,200,000 Ω

4. Convert 24.6 mV to volts.

0.0246 V

5. Which two displayed readings indicate opposite relative polarity: 12.60 V and -12.60 V? Explain the minus sign.

Red is below COM potential in the negative reading.

6. What does OL mean in resistance mode? Is it equal to zero ohms?

Open path or outside selected range; no.

7. In the virtual continuity exercise, an intact wire shows 0.2 Ω. Does the buzzer sound?

Yes; below 40 Ω.

8. A high-resistance wire shows 85.0 Ω. Does silence prove it is open? Explain.

No; finite resistance is above the threshold.

Meter-reading answers, cont.

Use the virtual instrument model for the continuity threshold and display examples.

9. Compare a 40 Ω path with a 39 Ω path on the fictional meter. Which causes a beep?

39 Ω only; threshold is strictly below 40 Ω.

10. A 4,700 Ω resistor displays OL with the lowest manual resistance range selected. What does auto range display?

4.70 kΩ.

11. In a voltage measurement, does the meter span two circuit points or become a series link?

It spans the points (parallel).

12. In the virtual series-current exercise, why is the dedicated gap required?

Current must flow through the meter shunt; other placements are blocked.

13. Why does our trainer reject resistance measurements while its fictional source is on?

Resistance mode uses its own test signal and needs a de-energized circuit.

14. Two identical 330 Ω resistors are in parallel. Predict the equivalent resistance.

165.0 Ω.

15. Why might an in-circuit resistance measurement differ from the isolated component value?

Additional parallel paths can lower equivalent resistance.

Troubleshooting answer key

Expected readings are from the fictional model, not tolerances or safe-work instructions for a physical meter.

Exercise 6: parallel path

Mounted fuse C: 10.00 kΩ in resistance mode because the holder has a parallel path. Isolated fuse: OL. Continuity mode reports OL on the 10 kΩ path because its range is limited.

Exercise 8: series current

100 Ω / mA input: 118.3 mA. 100 Ω / 10A input: 0.119 A (display rounding). 24 Ω / 10A input: 0.491 A. Current is E divided by total series resistance including the relevant shunt.

Exercise 9: hidden fault

Fault	Representative suspect reading	Interpretation
Open fuse	N1 / N2: 24.00 V	Open interrupts the loop
Open link	N3 / N4: 24.00 V	Open interrupts the loop
High-resistance switch	N2 / N3: 10.27 V	Large drop across switch
Shorted lamp	N5 / N6: 39.7 mV	Very small drop across load

Accept alternative valid measurements, but require a reading across the suspect plus a separate corroborating comparison. Do not grade a diagnosis from one isolated number.

Exercise 11: voltage under load

Load off N2 / N0: 12.60 V. Load on N3 / N4: 9.11 V. Load on N1 / N2: 3.415 V. When current is near zero, a resistance can have almost no voltage drop.

Safety discussion

Virtual practice does not establish qualification. OSHA 29 CFR 1910.334(c) restricts workplace testing to qualified persons and requires pre-use inspection and equipment appropriate for the circuits and environment. Low voltage alone does not guarantee safety.