

Reading ammeters and voltmeters in circuits

Grade 7 science (Year 8 · Class 7) · Worksheet

Name: _____ Date: _____ Class: _____

These problems train you to connect and read ammeters and voltmeters and to apply the rules for current and voltage in series and parallel circuits. You will convert milliamperes, add and subtract readings, read a meter scale and a graph, and spot faults. They suit Grade 7, Year 8 and Class 7 science (NGSS MS-PS2-3).

Start with level 1. Write the unit with every answer and state which rule you use.

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

Problem 1 Quantities and units (easy)

Naledi in Pretoria is revising electricity.

1. State the unit of current and its symbol.
2. State the unit of voltage and its symbol.
3. Name the meter used to measure each quantity.

Problem 2 Meter connections (easy)

Two meters are needed in a circuit with one bulb.

1. State how an ammeter is connected.
2. State how a voltmeter is connected.
3. State which meter is connected in series with the bulb.

Problem 3 Changing units (easy)

Convert these currents.

1. Change 350 mA into amperes.
2. Change 0.045 A into milliamperes.
3. Change 2.4 A into milliamperes.

Problem 4 Current in a series loop (easy)

Three ammeters are placed in a series circuit with two bulbs. The first ammeter, before bulb 1, reads 0.40 A. Another is between the bulbs and the third is after bulb 2.

1. Predict the reading on the second ammeter.
2. Predict the reading on the third ammeter.
3. Explain whether any current is used up by the bulbs.

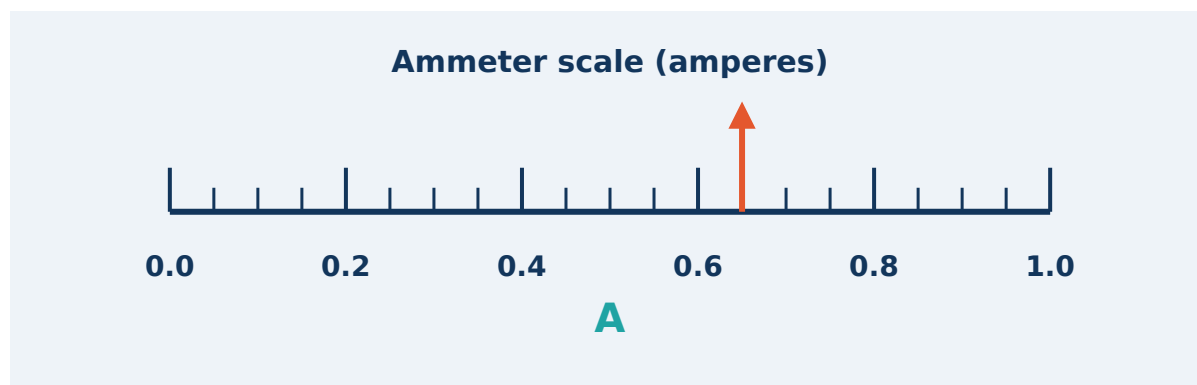
Problem 5 Voltage shared in series (easy)

A 6.0 V supply is connected to two bulbs in series. A voltmeter across bulb 1 reads 2.0 V.

1. Calculate the voltage across bulb 2.
2. State what the two voltages add up to.

Problem 6 Reading an ammeter scale (easy)

Arjun in Mumbai reads the ammeter scale in the figure.



An ammeter scale with a red pointer.

1. Read the current shown by the pointer.
2. Convert your reading into milliamperes.

Problem 7 Voltage in parallel (easy)

Three identical bulbs are connected in parallel to a 4.5 V supply.

1. State the voltage across each bulb.
2. Explain how you know.
3. State what happens to the voltage across the other two bulbs if one bulb is removed.

Problem 8 Branch currents (medium)

In a parallel circuit one branch carries 0.35 A and the other carries 0.20 A.

1. Calculate the current in the main wire.
2. State the rule you used.

Problem 9 The missing branch (medium)

Diego in Texas measures 1.20 A in the main wire of a parallel circuit. One branch has 0.45 A.

1. Calculate the current in the other branch.
2. Convert this current to milliamperes.

Problem 10 Three components in series (medium)

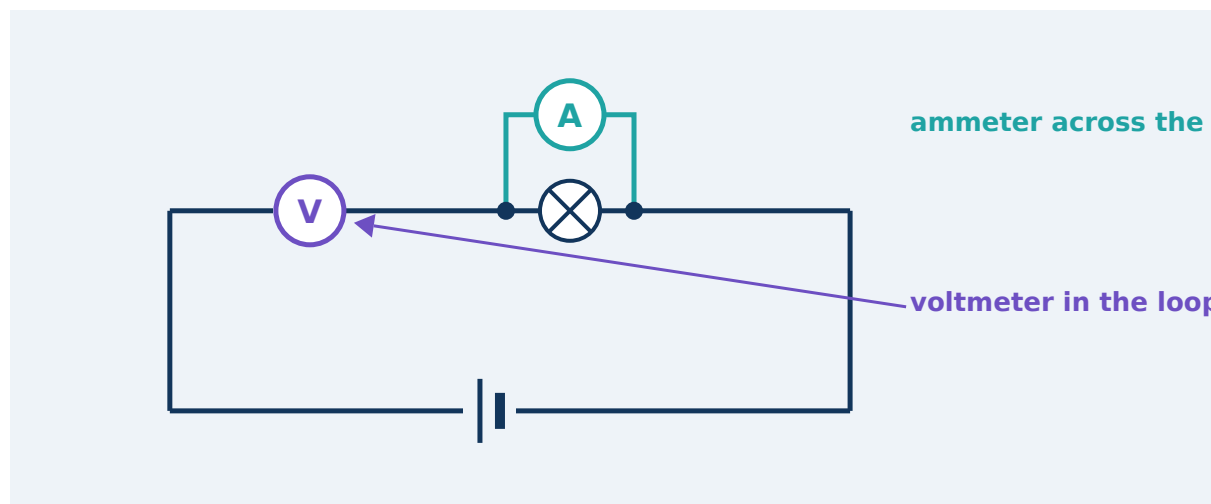
A 9.0 V supply is connected in series with three bulbs. The voltmeter readings across two of

them are 3.2 V and 2.8 V. The current at the first bulb is 0.15 A.

1. Calculate the voltage across the third bulb.
2. State the current at the third bulb.

Problem 11 Faulty meters (medium)

Hana in Nairobi connects the meters as shown.



A circuit with the meters connected incorrectly.

1. Identify the two mistakes.
2. Predict what happens when the ammeter is connected across the bulb.
3. Describe how to correct the circuit.

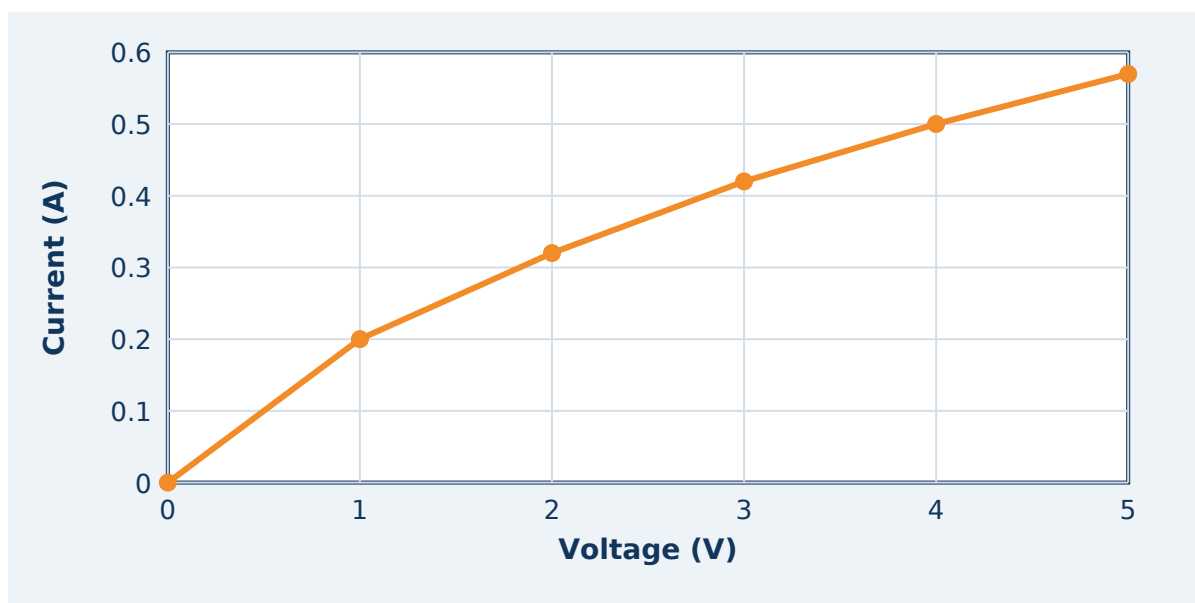
Problem 12 Charger currents (medium)

A power strip supplies two chargers in parallel. One draws 1500 mA and the other draws 0.50 A.

1. Convert 1500 mA to amperes.
2. Calculate the current in the main lead in amperes.
3. Convert the answer to milliamperes.

Problem 13 Current and voltage for a lamp (medium)

Femi in Lagos measures a lamp and plots the graph.



Current against voltage for a lamp.

1. Read the current at 3.0 V.
2. Read the voltage that gives 0.50 A.
3. Calculate how much the current increases when the voltage rises from 2.0 V to 4.0 V.

Problem 14 Motorbike lamps (medium)

A motorbike has a 12 V battery. The headlamp draws 2.5 A and the tail lamp draws 0.4 A. They are in parallel.

1. State the voltage across each lamp.
2. Calculate the current from the battery.
3. Explain where an ammeter should be placed to measure it.

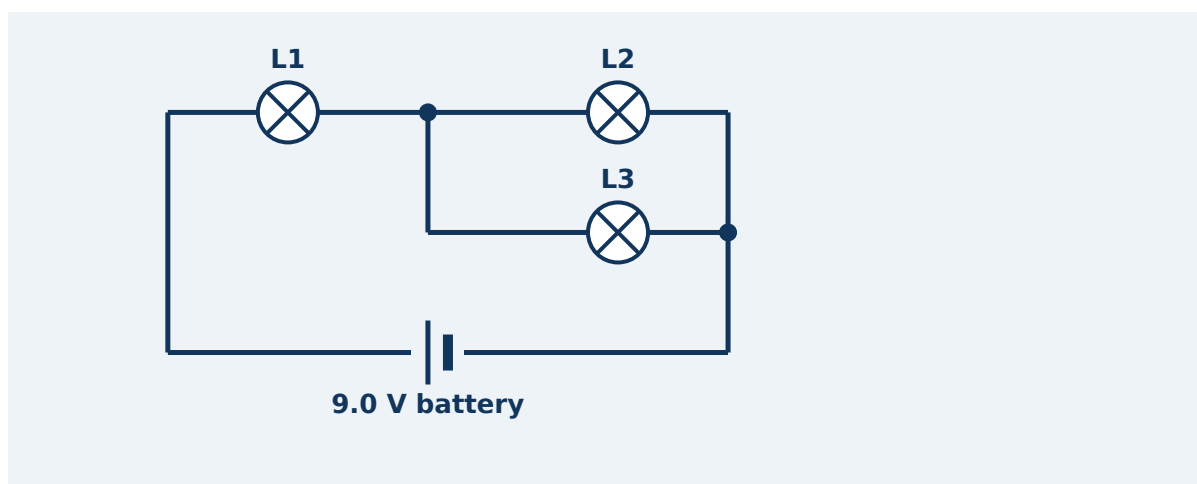
Problem 15 Solar panel readings (medium)

A solar panel is connected to a small motor. An ammeter reads 0.32 A at 08:00, 0.54 A at 09:00, 0.71 A at 10:00 and 0.83 A at 11:00.

1. Calculate the mean current.
2. Convert the 11:00 reading to milliamperes.
3. Calculate the largest increase between two readings in succession.

Problem 16 A series and parallel circuit (hard)

A 9.0 V battery supplies lamp L1 in series with lamps L2 and L3 in parallel. The main current is 0.60 A, the voltage across L1 is 4.0 V and the current through L2 is 0.35 A.



Lamp L1 in series with L2 and L3 in parallel.

1. Calculate the voltage across the pair L2 and L3.
2. State the voltage across L3.
3. Calculate the current through L3.
4. State the current through L1.

Problem 17 A voltmeter in the wrong place (hard)

Kwame in Accra connects a voltmeter in series with a bulb and a 3.0 V cell by mistake. The bulb does not light.

1. Predict the reading on the voltmeter.
2. Explain why almost no current flows.
3. Estimate the voltage across the bulb.

Problem 18 Do the readings agree? (hard)

In a parallel circuit with three branches, the branch ammeters read 0.62 A, 0.48 A and 0.35 A. The ammeter in the main wire reads 1.50 A. Each meter reading is uncertain by ± 0.02 A.

1. Calculate the sum of the branch currents.
2. Calculate the difference between this sum and the main current.
3. Calculate the greatest total uncertainty and say whether the readings agree with the rule.

Problem 19 Sharing 12 volts (hard)

Three lamps are connected in series to a 12.0 V supply. The voltage across the third lamp is 2.4 V. The voltage across the first lamp is twice the voltage across the second.

1. Calculate the total voltage across the first two lamps.
2. Calculate the voltage across each of the first two lamps.
3. Check that the three voltages add up to the supply voltage.

Problem 20 An overloaded extension lead (hard)

Lerato in Johannesburg plugs a 1.2 A desk fan, a 0.8 A lamp and a 1.5 A soldering iron into

an extension lead with a 3.0 A fuse. All three are in parallel.

1. Calculate the total current.
2. Explain whether the fuse will blow.
3. Calculate the total current if the lamp is unplugged and state whether the fuse is safe.