Where Current Goes

Use measurements to model series and parallel circuits

HS-ICP3-5 "Gather data to build a model to describe and explain the flow of current through series and parallel electric circuits."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline where the passage describes each path current can take. Circle statements that help you use the measurements to explain current at a split or a reunion.

Testing Two Circuit Paths

1. A lab team tests a model of two small heating elements using two 12-ohm resistors and a 6.0-volt power supply. They move one ammeter to different positions, recording current in amperes. They build a series circuit, then rebuild it as a parallel circuit. The supply stays at 6.0 volts for both tests.

2. In the series setup, charge has only one path through both resistors. In the parallel setup, charge can take either of two branches, each holding one resistor. Each parallel branch connects across the same supply voltage. The ammeter is placed in line with the part being measured. The table records five readings.

CURRENT MEASURED WITH A 6.0-VOLT SUPPLY

Circuit	Ammeter position	Current (A)
Series	Before first resistor	0.25
Series	Between resistors	0.25
Parallel	Before split	1.00
Parallel	Branch with first resistor	0.50
Parallel	Branch with second resistor	0.50

3. Current measures how much electric charge passes a point each second. At a junction, charge does not disappear: the currents entering and leaving must balance. A useful model should show where paths split and rejoin, then use the measured values to explain why current changes at a junction but not along an unbranched path.

2 ANSWER WITH EVIDENCE

Use the passage

1. What do the two series readings show about current along the single path? Use both measurements in your answer.

2. How do the two parallel branch currents compare with the current before the split? Use all three measurements.

3. Predict the current immediately after the parallel branches rejoin. Explain your prediction using the readings.

4. Compare current through one resistor in series with current through one resistor in parallel. What difference does the path arrangement make at the same supply voltage?

3 YOUR TURN

Your own words

The team adds a third identical 12-ohm resistor as another parallel branch while keeping the supply at 6.0 volts. Write a model in words that predicts current in each branch and before and after the junctions. Use the original readings and the idea that charge does not disappear to justify your predictions.

ANSWER KEY

Where Current Goes

PART 1 · READ AND MARK

Underline where the passage describes each path current can take. Circle statements that help you use the measurements to explain current at a split or a reunion. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What do the two series readings show about current along the single path? Use both measurements in your answer.	**Current stays at 0.25 A along the single path: it is 0.25 A before the first resistor and 0.25 A between the resistors.**
2	How do the two parallel branch currents compare with the current before the split? Use all three measurements.	**The two branch currents are 0.50 A each. Together they equal the 1.00 A measured before the split.**
3	Predict the current immediately after the parallel branches rejoin. Explain your prediction using the readings.	**It is 1.00 A. The two 0.50 A branch currents combine, and charge does not disappear at the junction.**
4	Compare current through one resistor in series with current through one resistor in parallel. What difference does the path arrangement make at the same supply voltage?	**Current through one resistor is 0.25 A in series and 0.50 A in parallel. With the same 6.0-volt supply, each parallel branch carries twice the current measured along the series path.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The path splits into three branches and then rejoins. Each branch still connects across the 6.0-volt supply, so I predict 0.50 A in each, matching the measured branches. The current before the split is 1.50 A because the three branch currents add. It is also 1.50 A after the branches rejoin because charge does not disappear.

Accept equivalent descriptions of the paths and junctions. The new branch prediction assumes identical resistors connected across the unchanged supply.