Trace the Paths

Model three ways to connect lamps to a battery.

P.6.c "Create models of series, parallel, and mixed direct current circuits."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each place the wire splits or rejoins, then number the lamps in the order you meet them along each complete path. Use your marks to plan the circuit models.

Lights at the Bike Stand

1. A direct current circuit needs a complete path from one battery terminal to the other. In your model, draw a battery as two unequal parallel lines, a lamp as a circle with an X, and wires as straight lines. A closed switch joins the wire. At a bike repair stand, one battery powers lamps P and Q. The wire goes through a closed switch, then P, then Q, before reaching the battery again.

2. Another battery powers two work lights, R and S. After a closed switch, the wire splits into two branches. One branch passes through R; the other passes through S. The branches rejoin before the wire returns to the battery. A model must show both branches and both junctions. Tracing either complete path takes you through the switch and just one lamp. The two paths share the battery but give the current separate routes between the junctions.

3. A third battery powers a counter lamp, T, and two shelf lamps, U and V. From the battery, the wire passes through a closed switch and T before it splits. One branch passes through U, while the other passes through V. The branches rejoin and return to the battery. Every complete path passes through T and one shelf lamp. T could instead sit after the branches rejoin; it would still be on every complete path.

2 ANSWER WITH EVIDENCE

Use the passage

1. Draw the circuit model for lamps P and Q. Include the battery and switch.

2. Draw the circuit model for lamps R and S. Show where the paths split and rejoin.

3. Draw the circuit model for lamps T, U, and V as first described.

4. Draw the other model described for T, U, and V, with T after the branches rejoin.

3 YOUR TURN

Your own words

Design a battery-powered display with three labeled lamps and one closed switch. Draw a new circuit model with one lamp on every complete path and the other two on separate branches; label the split and rejoin points.

Trace the Paths

PART 1 · READ AND MARK

Underline each place the wire splits or rejoins, then number the lamps in the order you meet them along each complete path. Use your marks to plan the circuit models. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Draw the circuit model for lamps P and Q. Include the battery and switch.	**One closed loop: battery, closed switch, P, Q, battery.**
2	Draw the circuit model for lamps R and S. Show where the paths split and rejoin.	**Battery and closed switch lead to a junction. Separate branches contain R and S; they rejoin before returning to the battery.**
3	Draw the circuit model for lamps T, U, and V as first described.	**Battery, closed switch, and T lead to a junction. Separate branches contain U and V; they rejoin before returning to the battery.**
4	Draw the other model described for T, U, and V, with T after the branches rejoin.	**Battery and closed switch lead to separate U and V branches. The branches rejoin, then the wire passes through T and returns to the battery.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

A closed loop leads from the battery through the closed switch and lamp A to a labeled split point. One branch contains lamp B, and the other contains lamp C. Both branches meet at a labeled rejoin point, then the wire returns to the battery. The model uses the battery and lamp symbols described in the passage.

Accept either order for lamps on the same unbranched path. Check that each model forms a complete circuit and that parallel branches connect at both a split and a rejoin point.