PAPER CIRCUIT BUILDER · AGES 7–14

Make a paper path

PAPER MODEL ONLY. These pieces do not carry electricity. Do not connect them to real batteries, outlets, lamps, or equipment. Ask an adult before using scissors.



Can you make one path through a switch and a lamp—then back to the source?



Your task: Arrange paper pieces. Trace the loop. Show what changes when the switch opens.

Everything is in these seven pages

Page	What you will use
2	Four component pictures and names
3	Cut & Connect directions and a path diagram
4	The actual component cards and three wire strips
5	Open / closed comparison worksheet
6	Picture vocabulary worksheet
7	Draw, trace and explain worksheet

Use

Printed pages, a pencil, and adult-supervised child-safe scissors. You can also point to the whole card sheet without cutting.

This is a new general circuit-concept extension. It is not a story excerpt, a model of Theo’s internal wiring, or a verified Book 1 chapter activity.

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Meet the four components

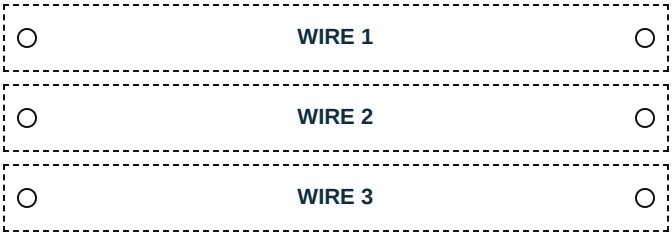
PAPER MODEL ONLY. These pieces do not carry electricity. Do not connect them to real batteries, outlets, lamps, or equipment. Ask an adult before using scissors.

BATTERY · SOURCE



In the model, the battery supplies energy. Start at + and return to −.

WIRES · PATH



Paper strips stand for the connections. Paper is not a conducting wire.

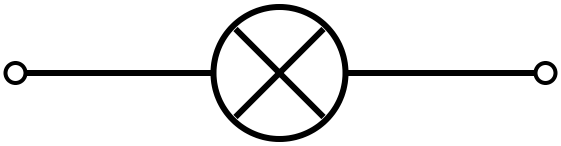
SWITCH · CONTROL



OPEN: GAP

A switch can leave a gap or join the path. It does not create energy.

LAMP · LOAD



The lamp uses energy in this model. Its two terminals must both be in the loop.

Point and say: Which picture is the source? Which piece can make a gap? Where must the path return?

Source, path, control, and load are four different jobs. All pictures here are symbols—not parts to build with.

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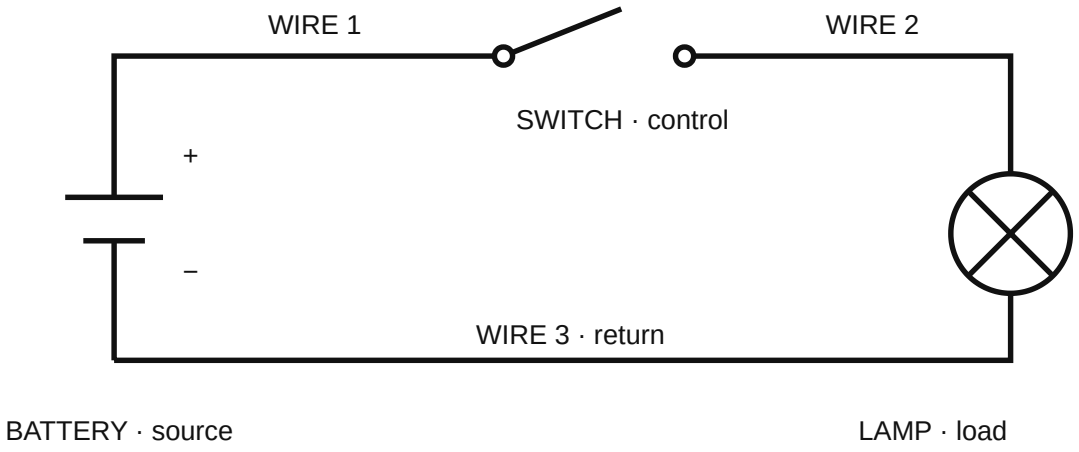
Activity 1 · Cut & Connect

PAPER MODEL ONLY. These pieces do not carry electricity. Do not connect them to real batteries, outlets, lamps, or equipment. Ask an adult before using scissors.

1. Use the **cut-out cards on the next page (page 4)**. Cut the four solid outside borders.
2. Inside the WIRE SET card, cut the three dashed strips.
3. Arrange the pieces on your desk in one loop. Touch the strip ends to the terminal circles.
4. Point to OPEN or CLOSED on the switch card. Use only that state when tracing.

Trace this path:
BATTERY (+) → WIRE 1 → SWITCH → WIRE 2 → LAMP → WIRE 3 → BATTERY (−)

Your path picture



The diagram starts with a gap at the switch. The pieces can face a different direction on your desk; the connections must still make the same path.

Make a prediction. What do you think the paper lamp should show when the switch is closed and every connection is present?

Test with your finger: Start at +. Can you follow every connection through the switch and lamp and back to −?

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Cut-out component cards

PAPER MODEL ONLY. These pieces do not carry electricity. Do not connect them to real batteries, outlets, lamps, or equipment. Ask an adult before using scissors.

Cut solid outside borders: 4 component cards. **Cut dashed borders:** 3 wire strips. Choose one switch state. Draw lamp rays only after your whole modeled path is complete.

BATTERY · SOURCE



+ POSITIVE: start point
− NEGATIVE: return point

A battery is the energy source in this model. Both terminals belong in the loop.

WIRE SET · PATH

Cut all three dashed strips. One strip joins each pair of component terminals.

WIRE 1

WIRE 2

WIRE 3

Paper represents a path only. It does not conduct electricity.

SWITCH · CONTROL



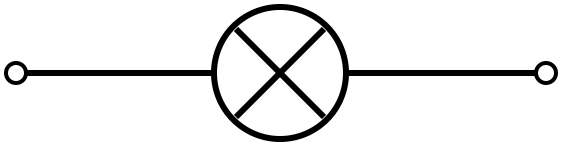
OPEN: GAP



CLOSED: JOINED

Point to one state. OPEN has a gap. CLOSED has a joined path.

LAMP · LOAD



Join WIRE 2 to one terminal and WIRE 3 to the other terminal.

PAPER RESULT: Closed switch + complete loop = draw 3 rays. Otherwise leave the lamp unlit.

Cut-line key: solid outside border = whole component card; dashed border = individual paper wire strip. All meaning is labeled, not color-dependent.

Battery + → wire → switch → wire → lamp → wire → battery −.
Keep the paper pieces away from all real electrical sources.

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Activity 2 · Open vs. Closed

PAPER MODEL ONLY. These pieces do not carry electricity. Do not connect them to real batteries, outlets, lamps, or equipment. Ask an adult before using scissors.

Use the page-4 cards. First choose OPEN, then choose CLOSED. Keep all three wire connections in place.

OPEN



OPEN: GAP

The two switch terminals are not joined.

CLOSED



CLOSED: JOINED

The two switch terminals are joined.

Predict, then compare

Switch state	Can I trace a complete loop?	Paper lamp: draw rays or leave unlit?
OPEN	☐ Yes ☐ No	_____
CLOSED	☐ Yes ☐ No	_____

One change I noticed:

Try one missing connection

Keep the switch CLOSED, but lift one paper wire strip away. Should your paper lamp still have rays? Explain why.

Explorer · ages 7–9: Point or say your answer. **Builder · ages 10–12:** Write one comparison. **Technician · ages 13–14:** Trace the exact gap and explain why the whole loop is interrupted.

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Picture vocabulary check

PAPER MODEL ONLY. These pieces do not carry electricity. Do not connect them to real batteries, outlets, lamps, or equipment. Ask an adult before using scissors.

Use these words: **SOURCE · PATH · CONTROL · LOAD**.
Write one job beside each picture. You may point and say instead.



BATTERY job: _____

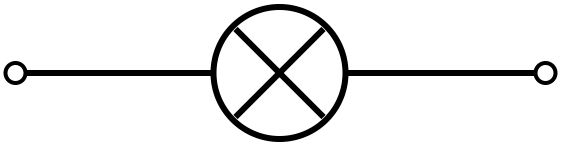


WIRE job: _____



OPEN: GAP

SWITCH job: _____



LAMP job: _____

Two words that change the result

OPEN means the path has a gap. **CLOSED** means the switch path is joined.

A closed switch and a complete loop make the modeled lamp _____.

A gap anywhere in the loop makes the modeled lamp _____.

Explain: Does the switch create energy, or control whether the path is joined?

This kit teaches one simple loop. Series/parallel calculations and real-device troubleshooting are not part of this activity.

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Draw it. Trace it. Explain it.

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Draw a **fictional paper circuit**. Include one battery, one switch, one lamp, and the full return path. Label + and −. Choose OPEN or CLOSED.

My modeled lamp is: ☐ lit ☐ unlit

My evidence is:

Tell your partner

“I changed _____. The paper lamp _____ because _____.”

Try again: Change only the switch state or remove one paper connection. Trace your new path. You can revise your answer.

Finish when you can point to the source, trace the modeled path, and explain how one gap changes the result. No wrong answer is required before you finish.

Discussion: What did you change, and what happened to the paper lamp?