Name: _____ Date: _____

Why One Bad Bulb Darkens a String of Lights

Circle group

Many families unpack a string of holiday lights. They plug it in. The whole string is dark. Somewhere, one small bulb has failed. Yet the other bulbs look fine. Why does one bad bulb put out the rest?

The answer is in how the bulbs are connected. Electricity flows only along a closed path. This path is called a circuit. Think of a loop. Electric current goes from the power source, through each part, and back again. If the loop is broken anywhere, the current stops everywhere.

On some older strings, the bulbs are wired in series. They sit one after another on a single path, like beads on a necklace. The current has no other way to go. Inside each bulb is a thin wire called the filament. When it breaks in one bulb, the path is cut. Every bulb goes dark.

The lamps in a house are different. They are wired in parallel. Each lamp has its own branch off the main wires. If one lamp burns out, the electricity still flows to the others. So the rest of the room stays lit.

Many newer strings have a tiny part in each bulb. It keeps the path whole if the filament fails. So the others stay lit. Always unplug a string before you touch its bulbs.

Questions

1. What is a circuit?

_____

_____

2. What happens to the current if the loop is broken anywhere?

_____

_____

3. What does it mean for bulbs to be wired in series?

_____

_____

4. How are the lamps in a house wired, and why does that help?

_____

_____

5. What should you do before touching the bulbs of a light string?

_____

_____

6. Why is a necklace of beads a good picture of a series circuit?

_____

_____

Words to know

circuit: a closed path that electricity flows around
current: the flow of electricity through a wire
series: one after another along a single path
parallel: side by side, each on its own separate path
filament: the thin wire inside a bulb that glows

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

Why One Bad Bulb Darkens a String of Lights

Triangle group

Many families have unpacked a string of holiday lights, plugged it in, and found the whole string dark. Somewhere along the wire, one small bulb has failed. Yet the other bulbs seem fine. Why should one bad bulb put out the rest?

The answer is in the way the bulbs are connected. Electricity flows only along a closed path, called a circuit. Think of it as a loop that carries electric current from the power source, through each part, and back again. If the loop is broken anywhere, the current stops everywhere.

On some older strings, the bulbs are wired in series. That means they sit one after another on a single path, like beads on a necklace. The current has no other way to go. When the thin wire inside one bulb, called the filament, breaks, the path is cut, and every bulb goes dark.

Compare that with the lamps in a house. They are wired in parallel, so each lamp has its own branch off the main wires. If one lamp burns out, the electricity keeps flowing to the others. That is why the rest of the room stays lit.

Many newer strings include a tiny part in each bulb that keeps the path complete if the filament fails, so the others stay lit. Always unplug a string before touching its bulbs.

Questions

1. What is a circuit?

_____

_____

2. What happens to the current if the loop is broken anywhere?

_____

_____

3. What does it mean for bulbs to be wired in series?

_____

_____

4. How are the lamps in a house wired, and why does that help?

_____

_____

5. What should you do before touching the bulbs of a light string?

_____

_____

6. Why is a necklace of beads a good picture of a series circuit?

_____

_____

Words to know

circuit: a closed path that electricity flows around
current: the flow of electricity through a wire
series: one after another along a single path
parallel: side by side, each on its own separate path
filament: the thin wire inside a bulb that glows

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

Why One Bad Bulb Darkens a String of Lights

Square group

Many families have unpacked a string of holiday lights, plugged it in, and discovered that the entire string remains dark. Somewhere along the wire, a single small bulb has failed, yet all of the other bulbs appear to be in perfect condition. Why should one bad bulb be able to put out the rest?

The answer lies in the way the bulbs are connected. Electricity flows only along a closed path, which is called a circuit. You can think of a circuit as a loop that carries electric current from the power source, through each part, and back to the source again. If the loop is broken anywhere along its length, the current stops everywhere.

On some older strings, the bulbs are wired in series. That means they sit one after another on a single path, like beads on a necklace, and the current has no alternative route. When the thin wire inside one bulb, called the filament, breaks, the path is cut, and every bulb goes dark.

Compare that arrangement with the lamps in a house. Those lamps are wired in parallel, so each lamp has its own branch off the main wires. If one lamp burns out, the electricity continues to flow to all of the others, which is why the rest of the room stays lit.

Many newer strings include a tiny part in each bulb that keeps the path complete if the filament fails, so that the other bulbs remain lit. It is always wise to unplug a string before touching its bulbs.

Questions

1. What is a circuit?

_____

_____

2. What happens to the current if the loop is broken anywhere along its length?

_____

_____

3. What does it mean for bulbs to be wired in series?

_____

_____

4. How are the lamps in a house wired, and why does that arrangement help?

_____

_____

5. What is it wise to do before touching the bulbs of a light string?

_____

_____

6. Why is a necklace of beads a good picture of a series circuit?

_____

_____

Words to know

circuit: a closed path that electricity flows around
current: the flow of electricity through a wire
series: one after another along a single path
parallel: side by side, each on its own separate path
filament: the thin wire inside a bulb that glows

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: Why One Bad Bulb Darkens a String of Lights

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: Why One Bad Bulb Darkens a String of Lights

Easier · 218 words · Flesch-Kincaid grade 2.9

1. A closed path that electricity flows along.
2. It stops everywhere.
3. They sit one after another on a single path.
4. In parallel, so each lamp has its own branch and the others stay lit if one burns out.
5. Unplug it.
6. The beads sit in one line on one path, so if the line is cut, everything on it is affected.

Triangle: Why One Bad Bulb Darkens a String of Lights

This passage · 224 words · Flesch-Kincaid grade 4.7

1. A closed path that electricity flows along.
2. It stops everywhere.
3. They sit one after another on a single path.
4. In parallel, so each lamp has its own branch and the others stay lit if one burns out.
5. Unplug it.
6. The beads sit in one line on one path, so if the line is cut, everything on it is affected.

Square: Why One Bad Bulb Darkens a String of Lights

Harder · 257 words · Flesch-Kincaid grade 6.9

1. A closed path along which electricity flows.
2. It stops everywhere.
3. They sit one after another on a single path, with no alternative route.
4. In parallel, so each lamp has its own branch and the others keep working if one burns out.
5. Unplug it.
6. The beads sit in a single line on one path, so if the line is cut, everything on it is affected.