

# RACING TO THE FUTURE™

## SCIENCE LESSON #1 WORKSHEET

### BASIC ELECTRICAL CIRCUITS

In this worksheet you will learn about electrical circuits, including what they look like, how they work, how to draw a diagram of them and how they are used in Racing to the Future™.

Electrical *circuits* are everywhere. They can be as simple as a battery connected to a light bulb, or as complex as those found in a computer. Circuits are the roads that carry electricity. *Electricity* always moves from the *negative* pole of a power supply to the *positive* pole. That movement is the current which is measured in *Amperes*. The amount of electricity that moves is the *voltage*. Electricity is made up of *electrons*.

Like people, electrons will never leave “home” unless they can get back; therefore, electrons will only flow through a circuit that has a complete path between positive and negative poles. If the electrons don’t flow, then power won’t flow, and anything connected to the circuit will not turn on. In addition, electrons are lazy: they will always take the path of least *resistance*, or the easiest way to move between poles. For example, if given the choice between a path with a lightbulb or a path without, they will take the path without the lightbulb.



Electrical circuits can be represented by special diagrams. There is a symbol for each electrical component in a circuit.

#### Symbols used to represent circuit parts:

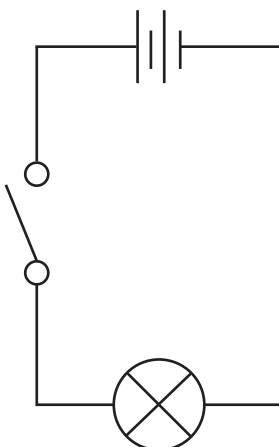
POWER SUP- 

LIGHT BULB: 

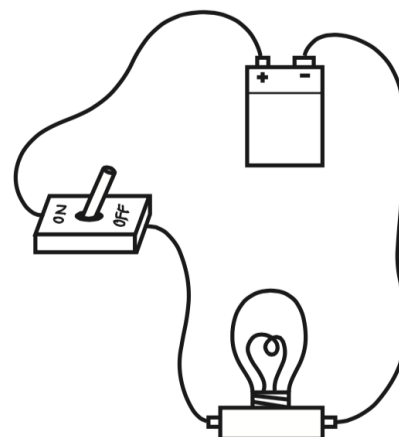
WIRE: 

SWITCH:  (OPEN)  
 (CLOSED)

#### CIRCUIT DIAGRAM:

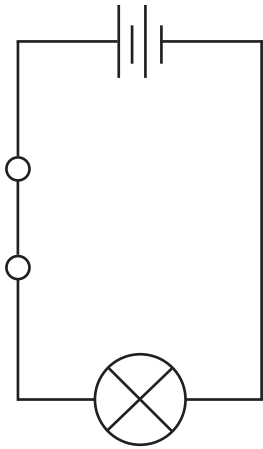


#### CIRCUIT DRAWING:

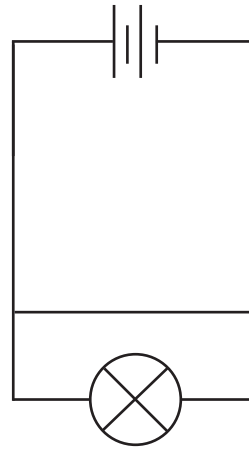


# Will The Lightbulb Turn On?

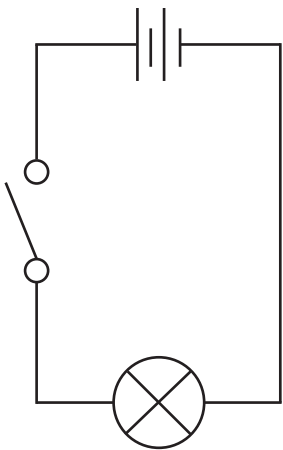
On this page, specify whether you think the lightbulb in each circuit will turn on or not. The first two circuit diagrams are examples.



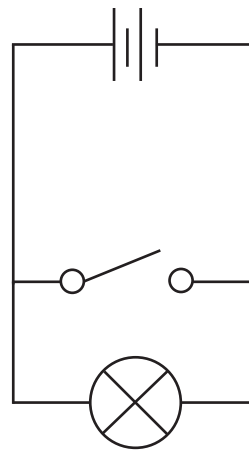
The lightbulb in this circuit will turn on because the switch is closed, allowing electricity to flow through it to the lightbulb.



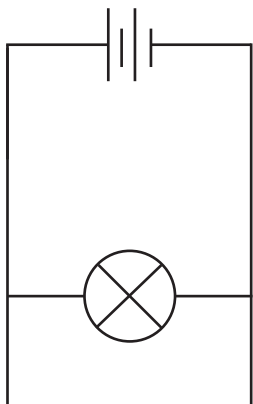
The lightbulb in this circuit will not be on because there is another wire bypassing the lightbulb, and since electricity takes the path of least resistance, it will not pass through the bulb and turn it on.



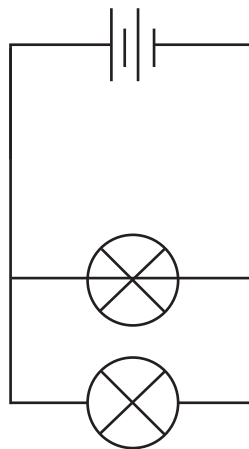
**A**



**B**



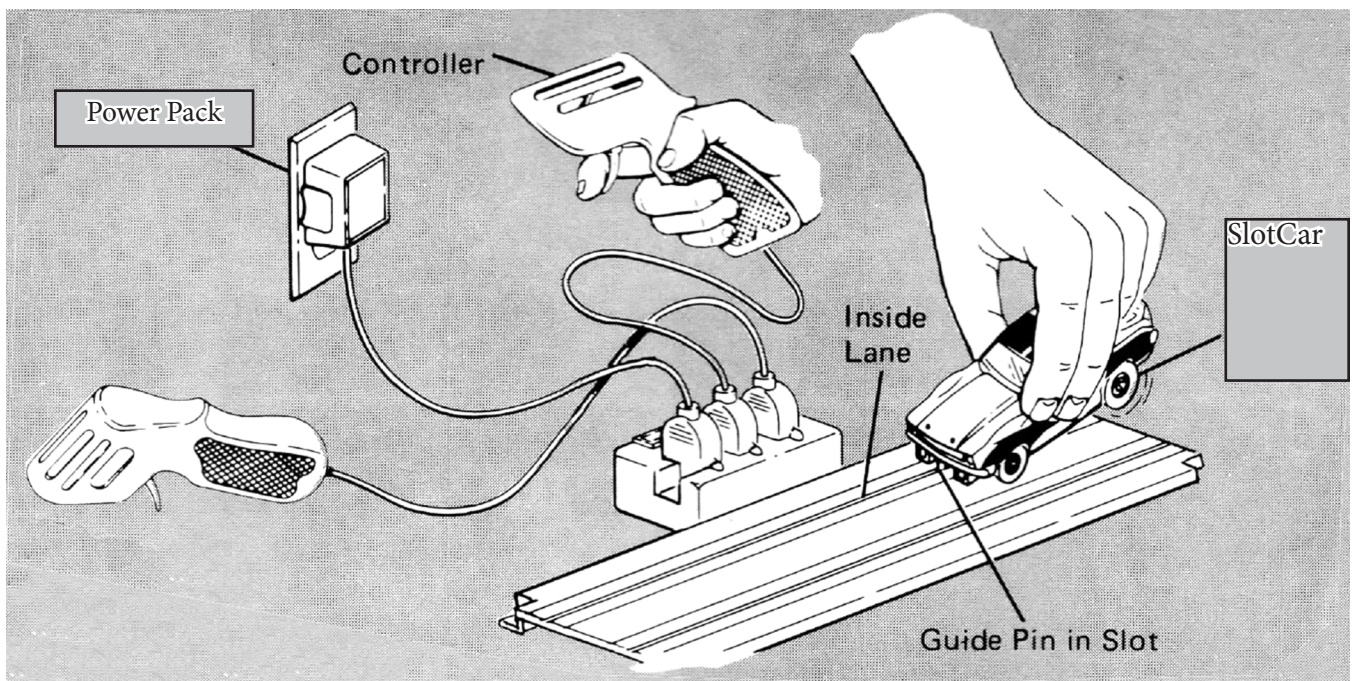
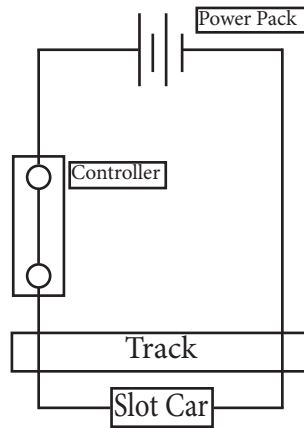
**C**



**D**

# How It Works on the Race Track

Below is a diagram and a drawing of how the circuit works on the race track. We replaced the lightbulb with the car and the on/off switch is the controller.



**Activity:** Complete the following sentences about the race track diagram above.

The electricity leaves the \_\_\_\_\_ and passes across the \_\_\_\_\_.

It travels on through the \_\_\_\_\_ and powers the \_\_\_\_\_.

Slot Car

Controller

Track

Power Pack

# Answer Key to Racing to the Future™ Lesson #1

From Page 2

Answers: A. No, B: Yes, C. No, D. Yes

From Page 3:

The electricity leaves the Power Pack and passes across the Controller.

It travels on through the Track and powers the Car.

Slot Car

Controller

Track

Power Pack