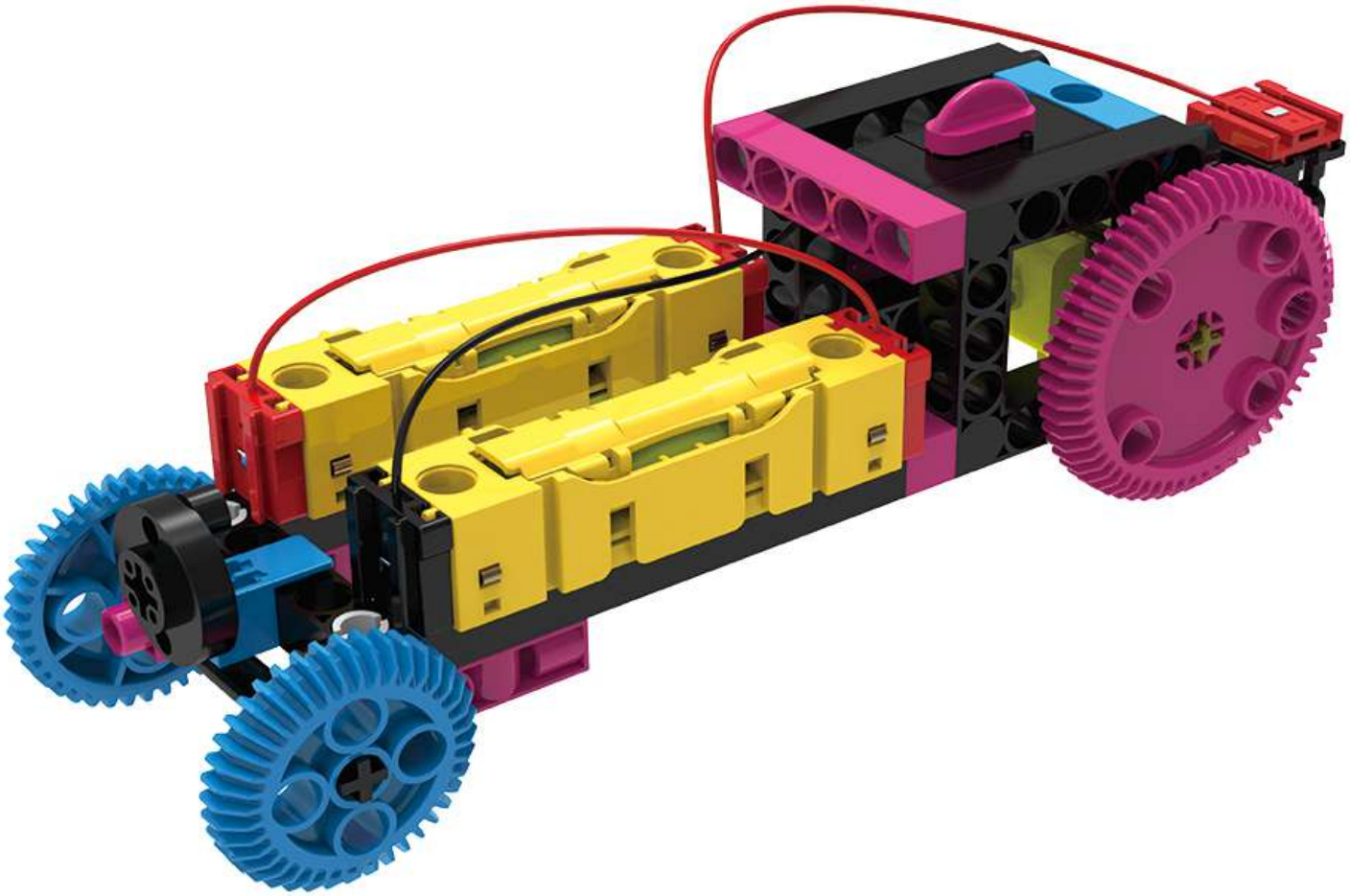
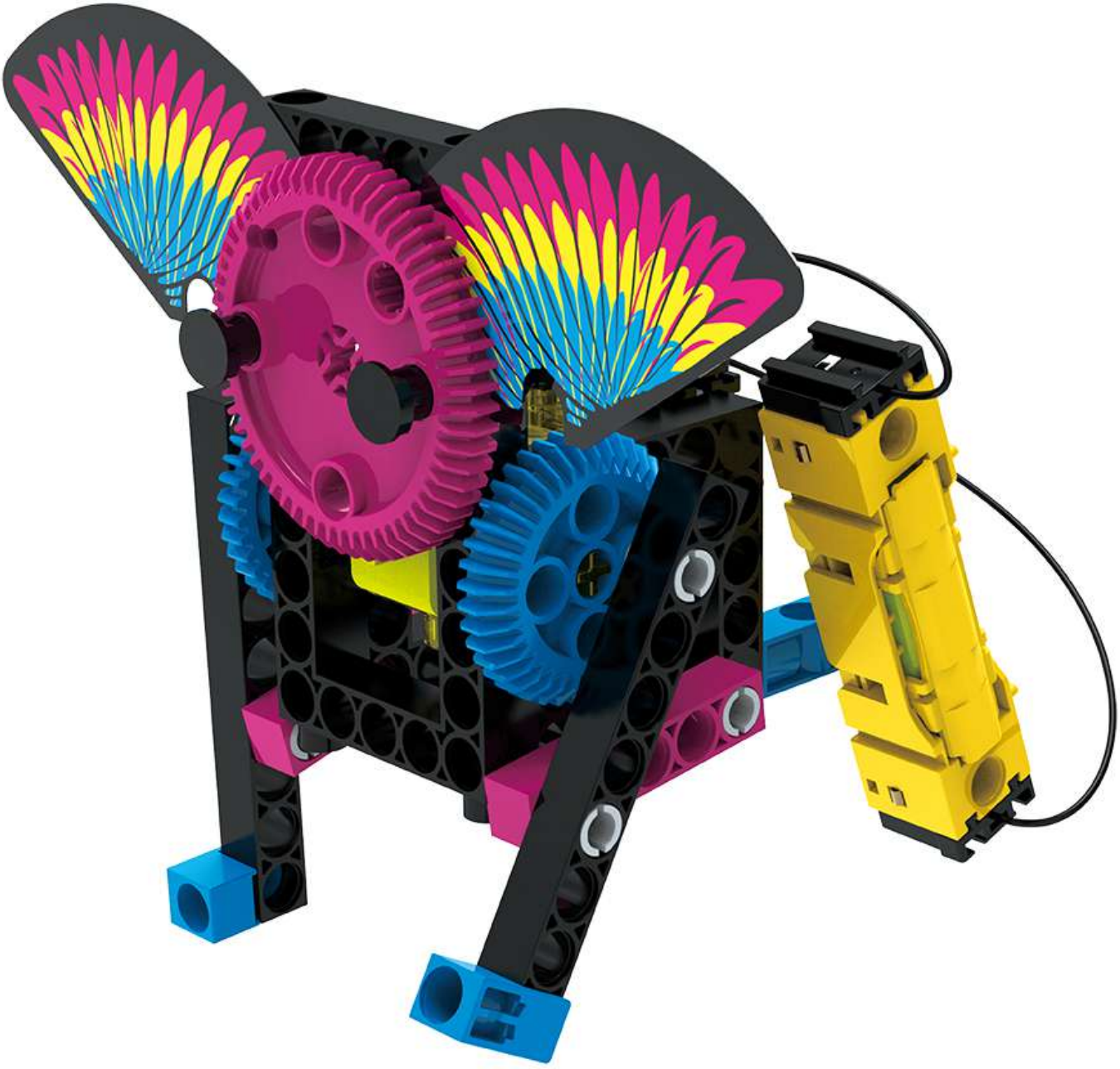
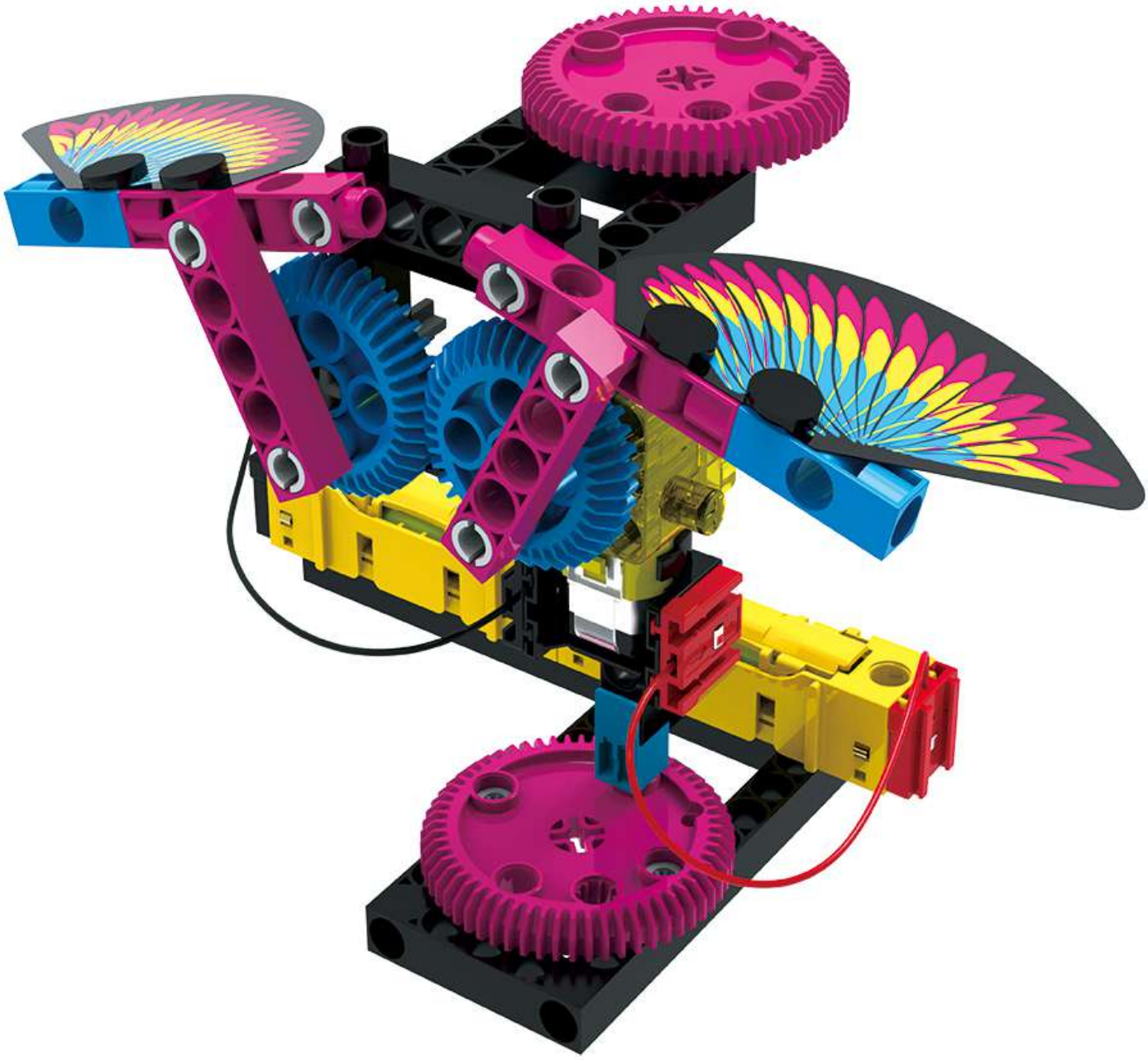
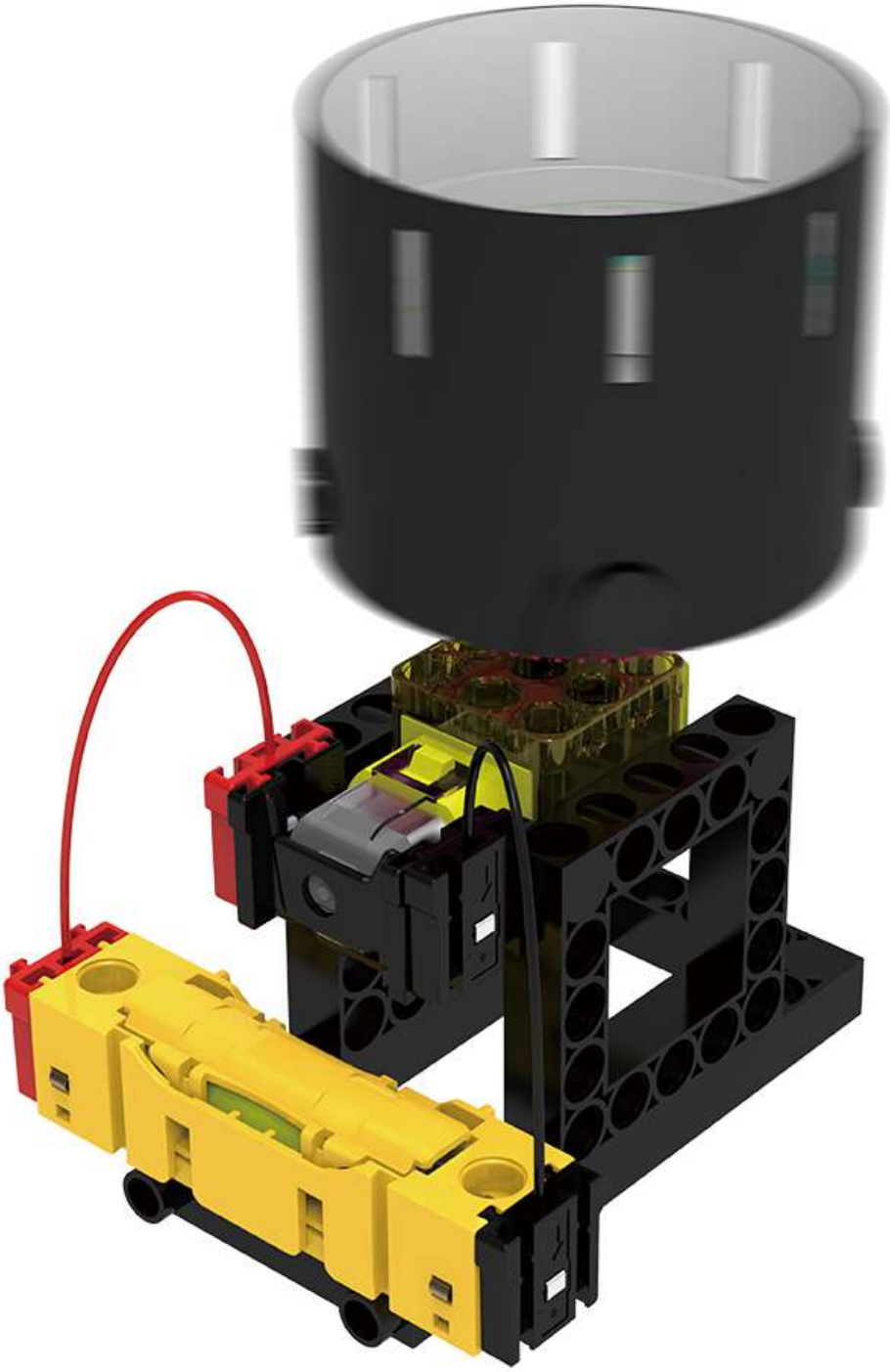
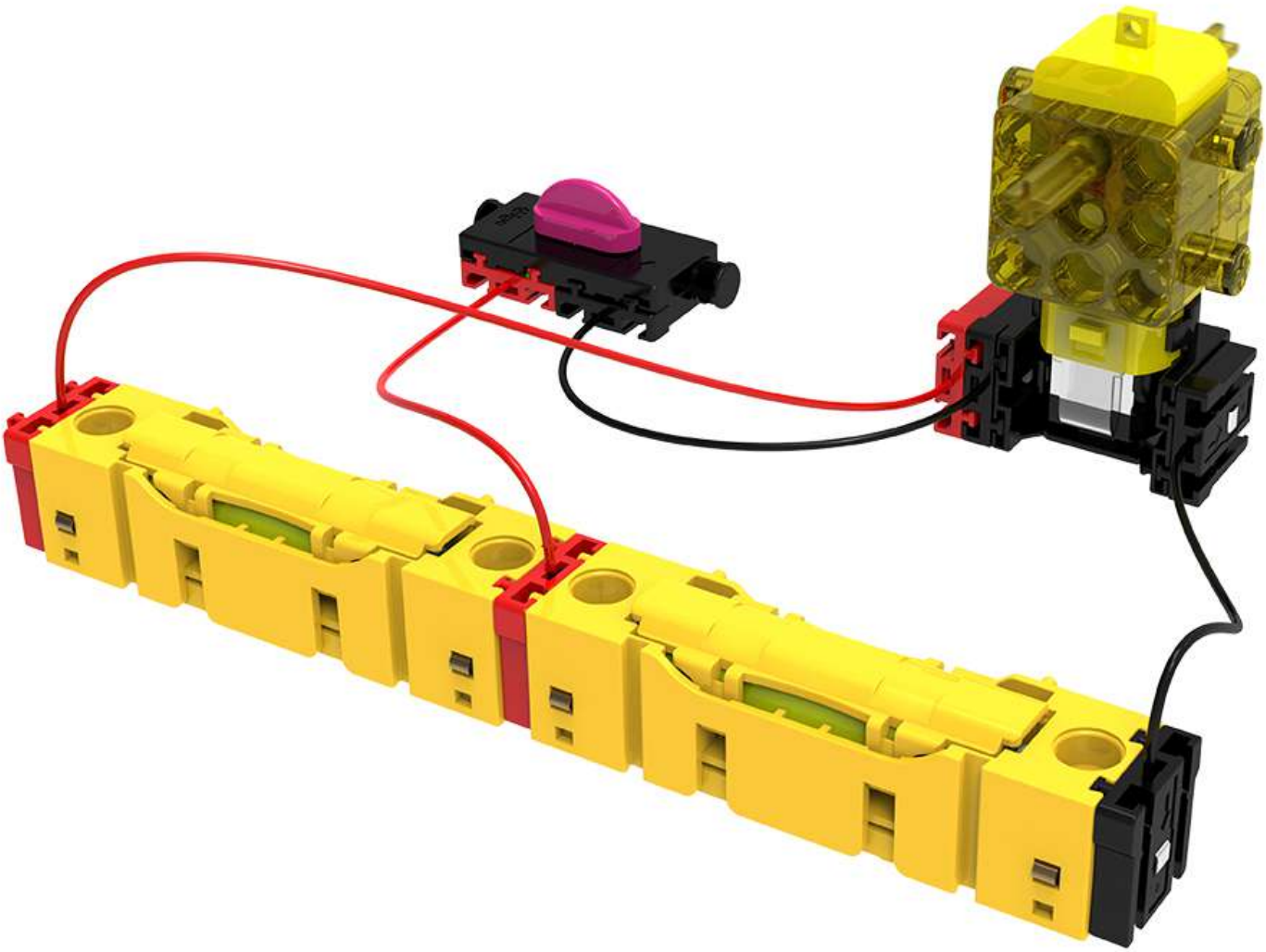
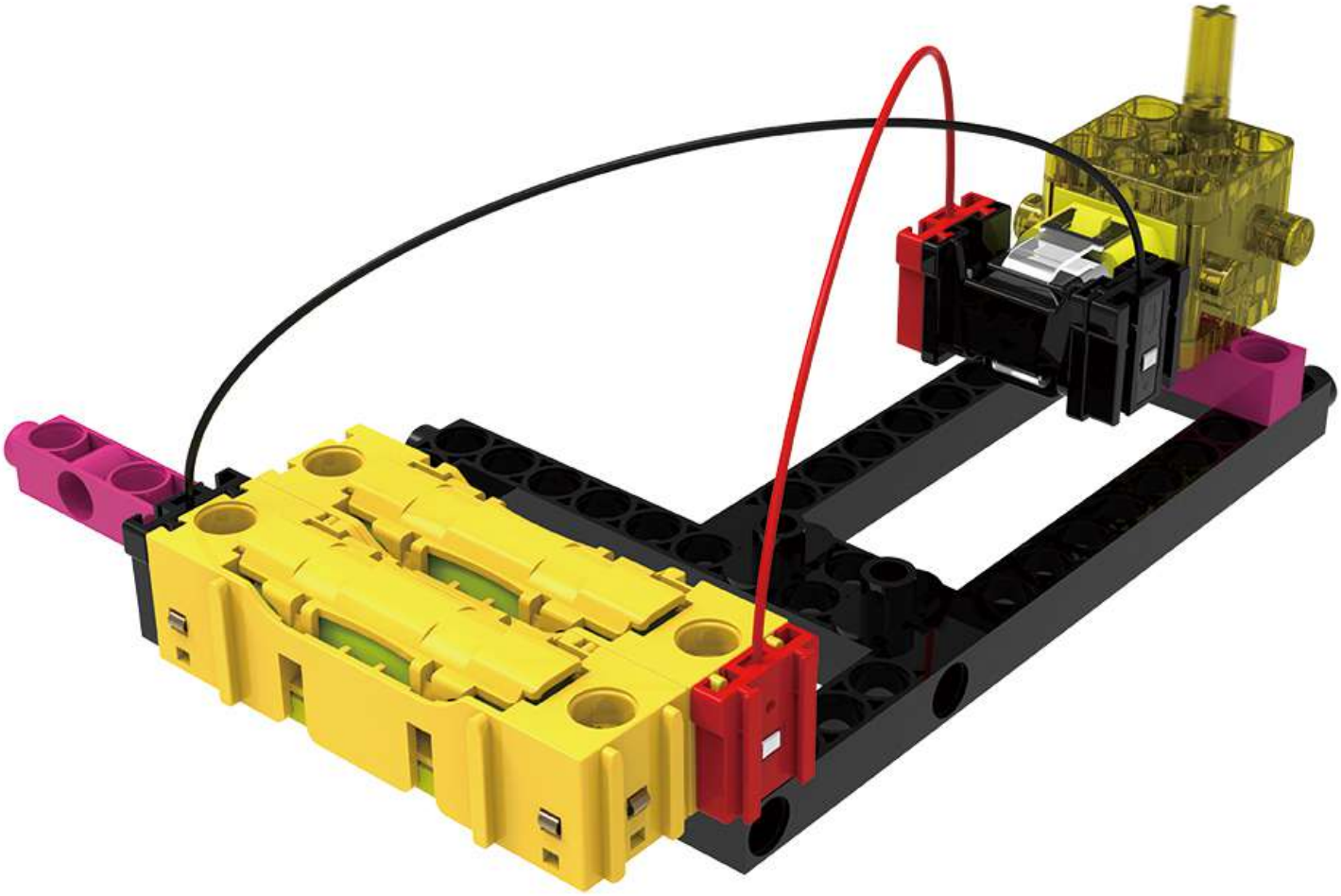


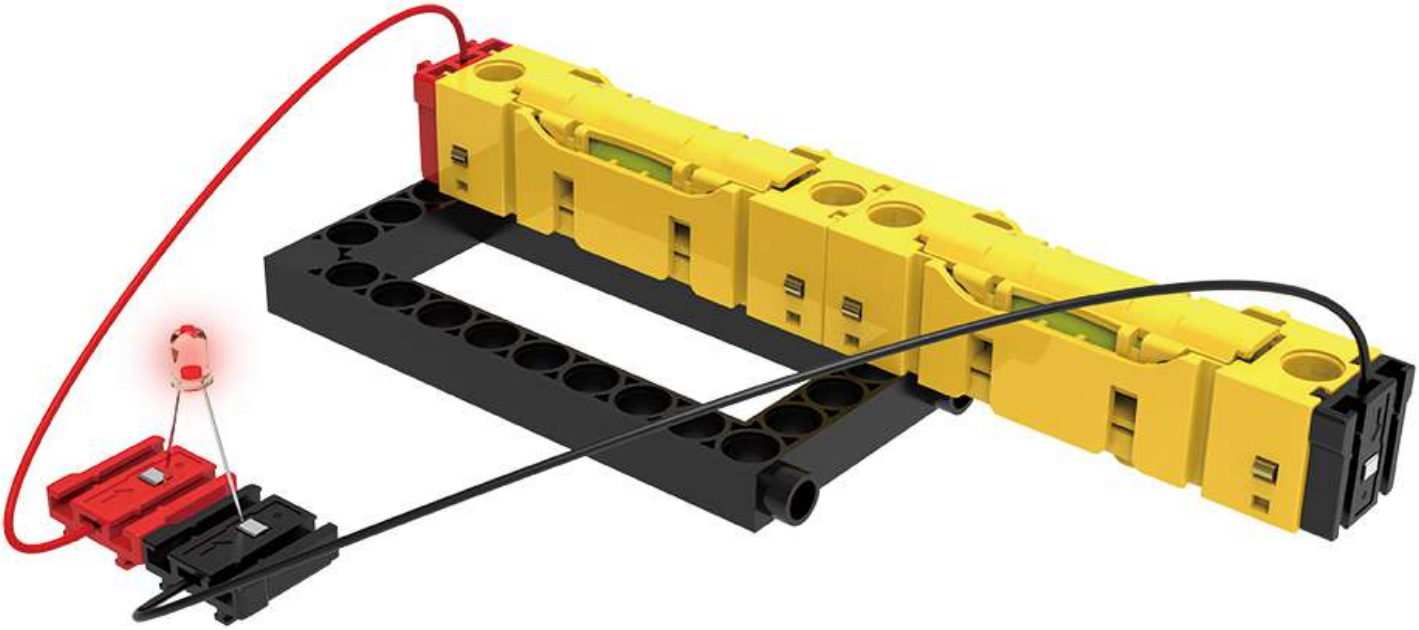


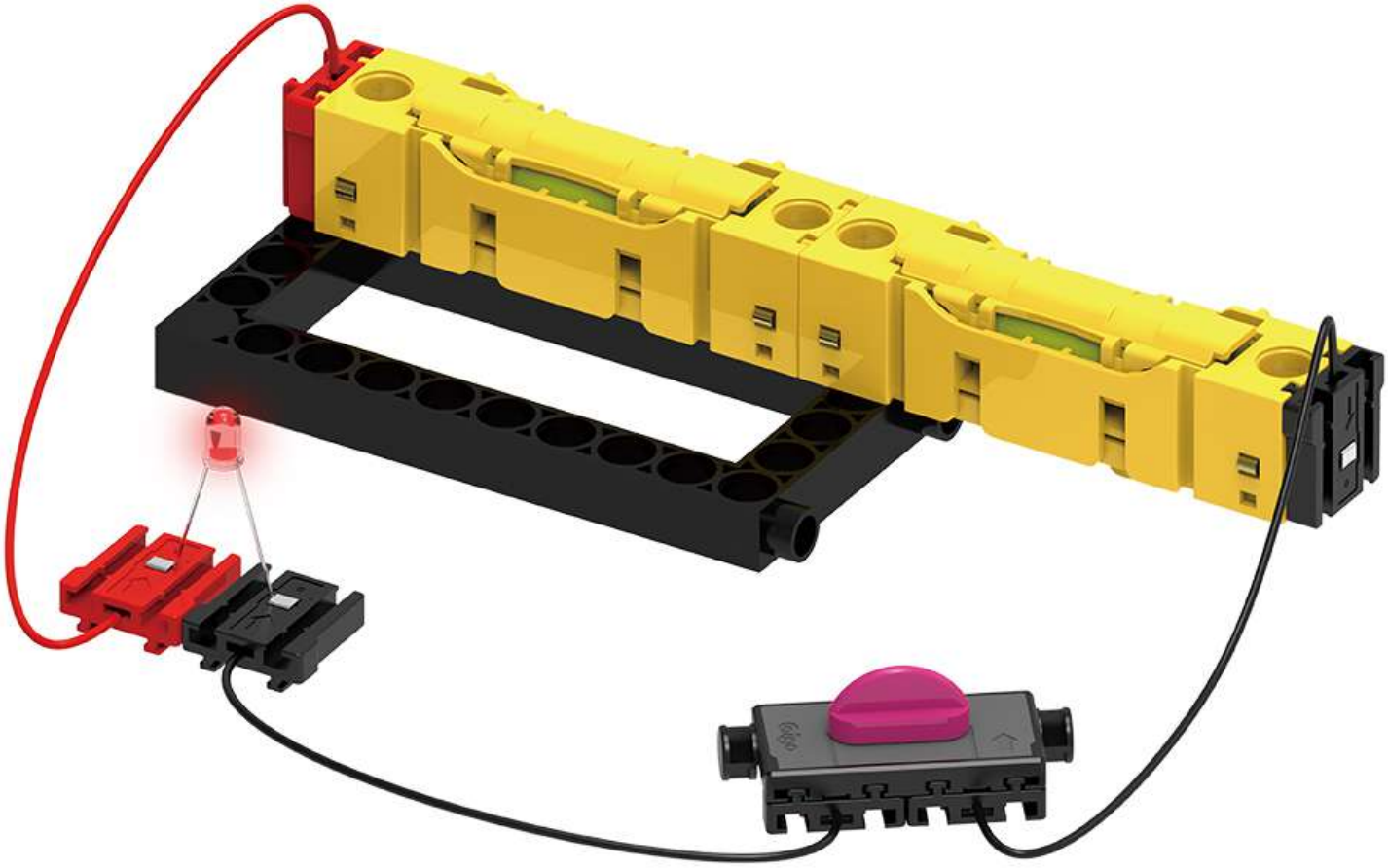


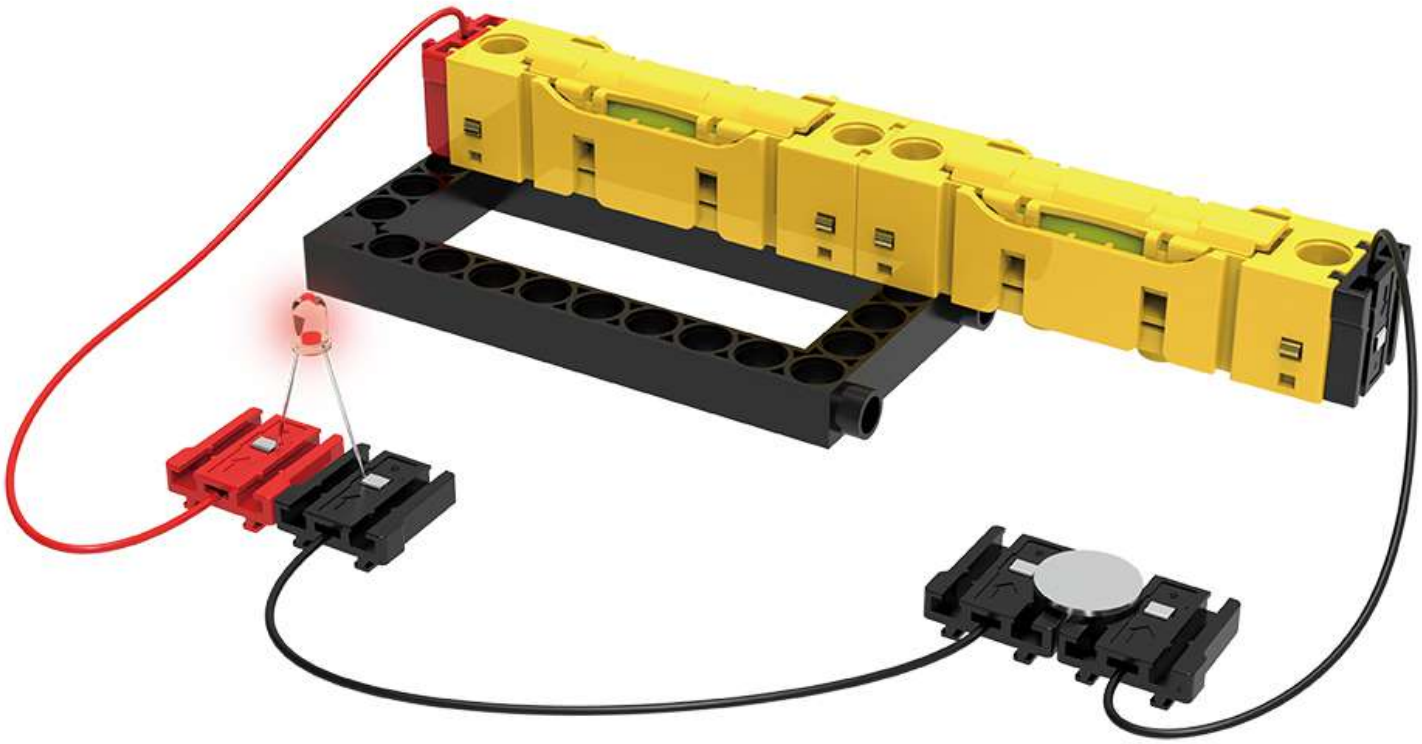




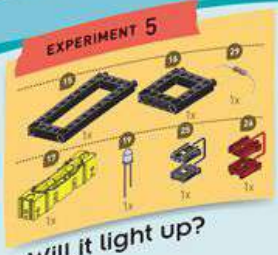








EXPERIMENT 5



Will it light up?

You will need

– Parts shown above, with battery installed

Here's how

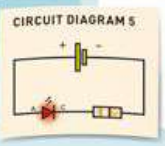
1. Assemble the circuit following steps 1–6. In step 4, you must wrap one end of the RESISTOR around the shorter leg (the negative pin) of the LED. Whenever you use the RESISTOR in the circuit, please wrap one end of the RESISTOR three times around the LED. You will use this LED+RESISTOR subassembly every time you use the LED in this kit.

2. When the circuit is complete, what happens?

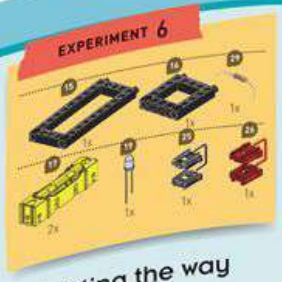
WHAT'S HAPPENING?

You didn't do anything wrong! The battery is not providing enough voltage for the **LED** to light up. LEDs are made of a semiconductor material that emits energy in the form of light when current flows through it. Depending on the material used, LEDs can emit any color of visible light, or invisible infrared or ultraviolet light. The LED's shorter leg is called a **cathode (C)**, and the longer one is an **anode (A)**. LEDs only work in one direction. When turned the wrong way, they won't let current through and they won't light up.

CIRCUIT DIAGRAM 5



EXPERIMENT 6



Lighting the way

You will need

– Parts shown above, with batteries installed

Here's how

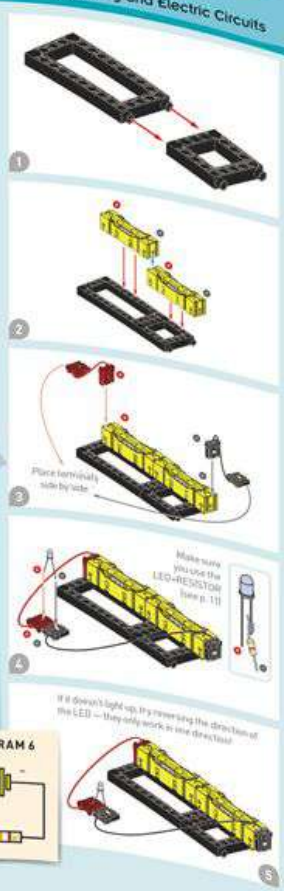
1. Follow the steps to assemble the circuit and observe what happens this time!

WHAT'S HAPPENING?

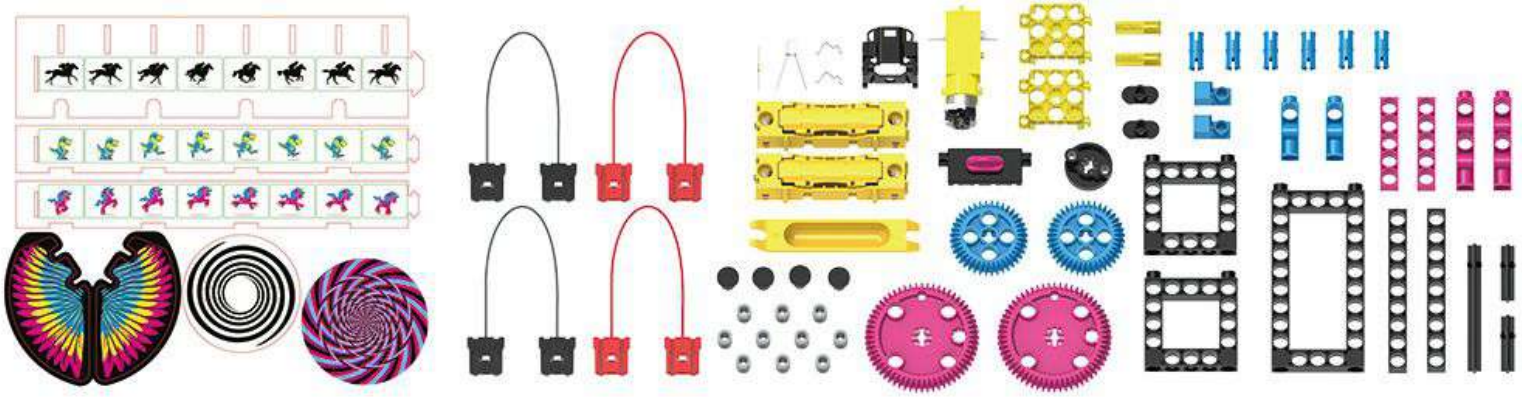
This time, with two batteries in a series circuit, there is enough voltage for the LED to light up. The voltages are added together, yielding twice the voltage. But what is voltage?

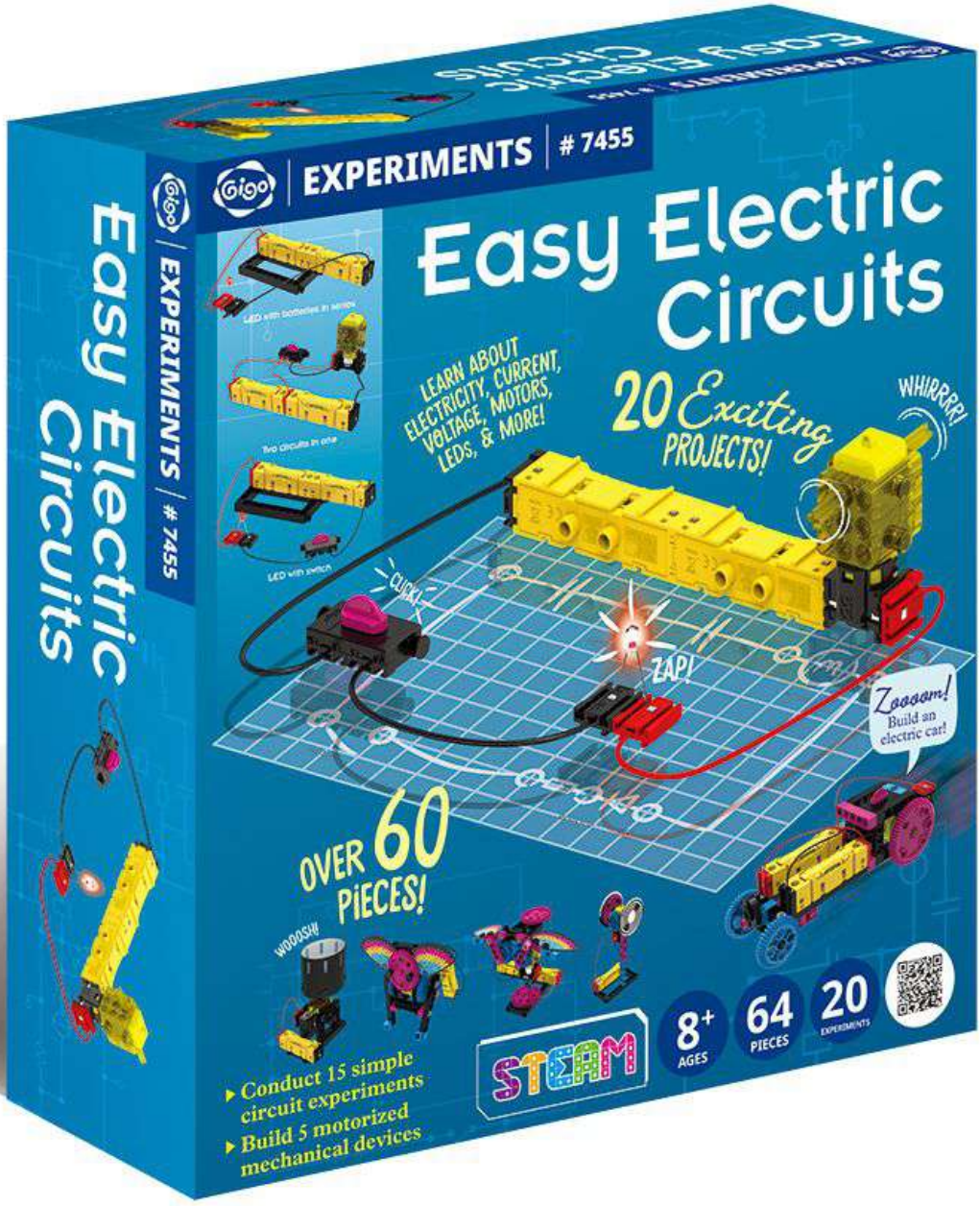
You can think of **voltage** as the pressure with which something like a battery pushes electrons out of one of its terminals, and with which it sucks up the electrons at the other terminal. Electrical voltage is measured in **volts (V)**.

And what is a resistor? **Resistors** are components that have a certain constant electric resistance. They reduce the current and voltage in a circuit. They usually look like small barrels with two terminal wires. The resistance value is indicated by a color code printed on the barrel. The LED in your circuit will burn out after some time without the resistor, because it is designed for lower voltages than the batteries provide.



CIRCUIT DIAGRAM 6

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