# Learning about electricity

## Circuit builder card games

**Learning objectives:**
**Children will revise the materials needed to build a simple circuit.**
**Children will understand that a solar cell can take the place of a battery in a circuit**

### Set up the game

You will need a set of image cards to represent each part of the circuit: wires, battery (or solar cell), bulb. Other parts, such as switches can be added for complexity. The children might like to draw their own symbols on cards, or you can use the symbols provided below). Each group will need approximately twice the number of 'wire' cards as other cards. Learners will need to have experienced building real circuits prior to playing this game. It would be beneficial to have the real components available so that the children can match the cards to the actual materials and can use these to prove that their circuits work.
Kits such as the 'Electricity Blocks sets by EZBlocks are a great way to link circuit building with an understanding of the symbols used to draw circuit diagrams.

### Play the game:

**Game 1: Circuit builder race**
Turn all of the image cards face down. The children play in groups or pairs, taking turns to pick a card. The winning team is the first to draw the cards representing a complete circuit. Both teams must be in agreement that a complete circuit could be built using those pieces, and the winning team must must lay out the cards to show how the circuit would be built. This can be checked using the real components in the event of disagreement.

**Game 2: Circuit builder Bingo**
The circuit image cards are placed face down and one child acts as the 'caller'. This child turns over each card in turn and states what it shows. Cards are left face up once selected. As soon as a complete circuit could be built with the components selected, children must shout "CIRCUIT!" with the winner bing the one who calls out first, who keeps those cards. All players must be in agreement that a complete circuit could be built with the components revealed and the child who calls 'CIRCUIT' must lay out the cards to show how the circuit would be built. Play with multiple sets of image cards to extend the game and the winner is the player with the most cards at the end.

**Game 3: Extended Circuits**
Cards are placed face up. One child, or the teacher, call out different combinations of pieces (which can be prepared in advance) such as "two bulbs, three wires, one battery" or "4 solar cells, 5 wires, one bulb". Teams race to collect the cards matching the pieces called out and to arrange them into a circuit, if it is possible to do so. The team must call out 'CIRCUIT!" when they have arranged their cards. Extend the game by asking what the effects might be of this arrangement (eg. how bright the bulb would be and why.)

**Start learners off by:**

Begin by ensuring that children can build a simple circuit using real components. They need to be able to recognise what the images on each card represents and to match cards to components. In the early stages of working with circuits, it is very important that learners maintain access to a set of real components so that they can back up this revision by building circuits in real life.

**Move learners on**

Once children are secure with the idea of circuit building, these games are also useful for learning and revising the correct symbols for drawing circuit diagrams. At first, you can play using cards with both a picture of the component and its corresponding symbol in a traditional circuit diagram. Eventually, the children can play using only cards with standard circuit diagram images.

**Challenge learners further by:**

Challenge children to prove that their circuits work by building them and ensure that they can explain what the purpose of each part of the circuit is. Encourage children to explain what is happening in the circuit in appropriate terms e.g."Electricity that was stored in the battery is flowing along the wires and the electric current is making the bulb light up". Extend learning by asking children what will happen with greater or smaller numbers of batteries, PV cells or bulbs (this must have been experienced practically first through the building of real circuits).

**At the end of this activity:**

**All** children will be able to build a simple circuit and represent this with matching cards.
**Most** children will be able to explain how a simple circuit works, using the image cards as prompts.
**Some** children will be able to explain the effects of fewer or additional components (such as bulbs or batteries) in a circuit.