7 How a torch works

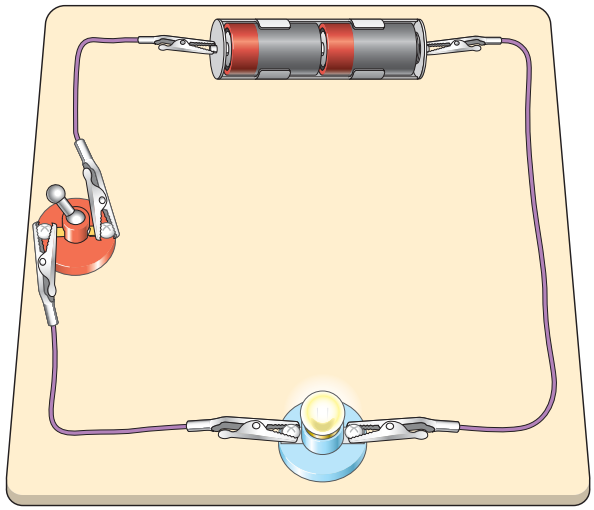
A torch uses a circuit and all of the components we have seen so far.

On pages 14 and 15, you saw how a circuit was made using batteries, bulb and switch. This circuit is shown again here in Picture 1.

This is the circuit used in a very useful piece of equipment – the torch.

However, the circuit does not make a very useful torch when placed on a board. To be useful, the circuit must be carefully fitted into a case.

▼ **(Picture 1) A circuit that can be used to make a torch.**

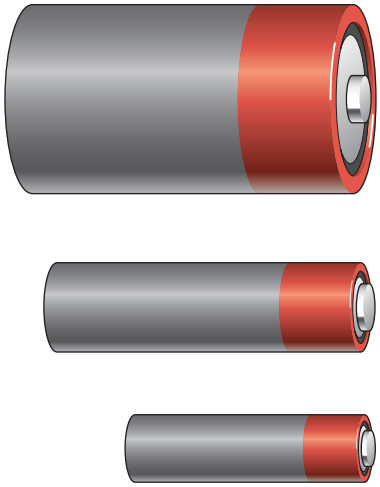


Choosing batteries

There are many sizes of torch. Why is this? Mostly because different torches use different sizes and different numbers of batteries.

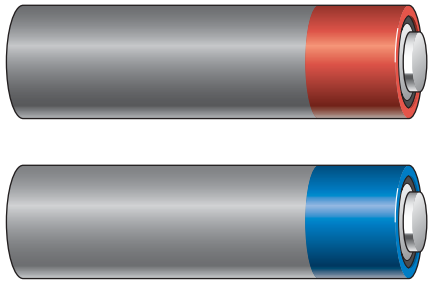
The bigger the battery, the more **POWER** it gives out and the longer it lasts (Picture 2). But you can get long-lasting batteries in each size, too (Picture 3).

Two, four and even six batteries used in a line are common in torches. The batteries must all be placed in the case facing the same direction. In general, the more batteries, the bigger the voltage and the more powerful the bulb can be.

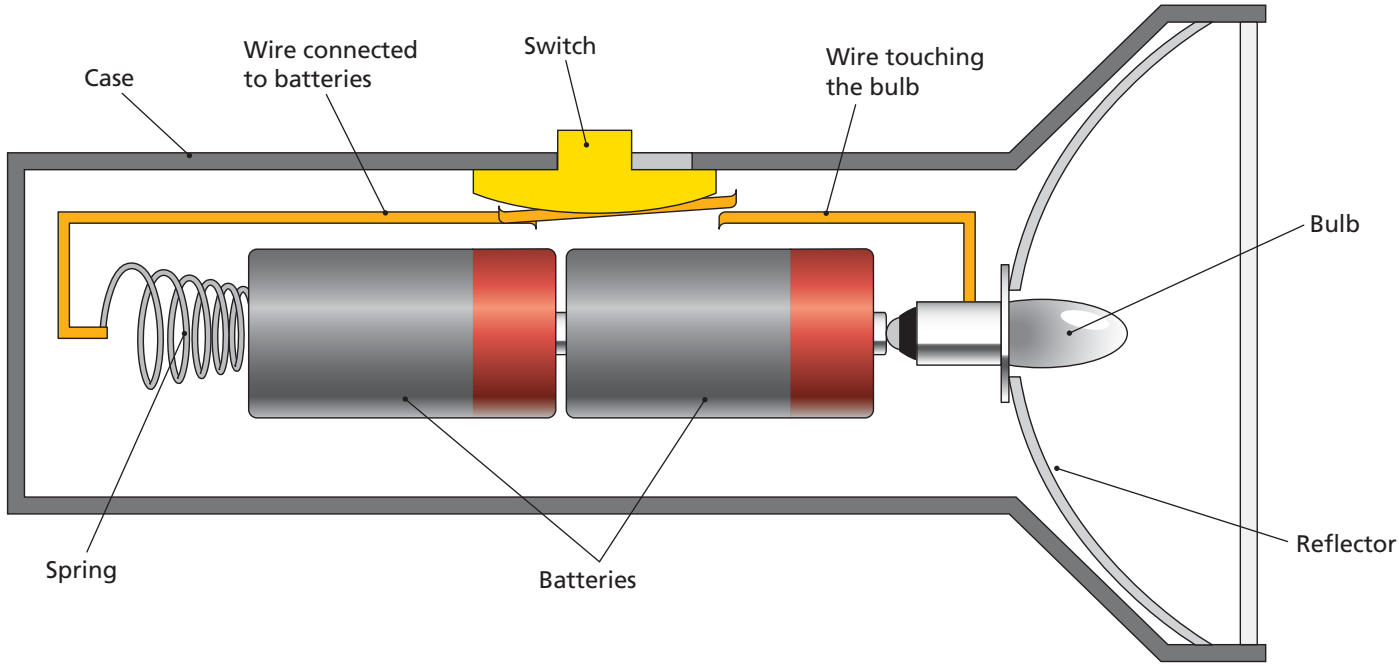


◀ **(Picture 2) These batteries all have the same voltage, but they have different amounts of chemicals packed inside them. The bigger the battery, the longer it will last.**

▼ **(Picture 3) These batteries are the same voltage and the same size, but the one on the top lasts longer than the one on the bottom. It is more expensive to buy, but because it lasts longer, it is cheaper to run. It lasts longer because it has different chemicals packed inside it.**



▼ **(Picture 4) How a torch works.**



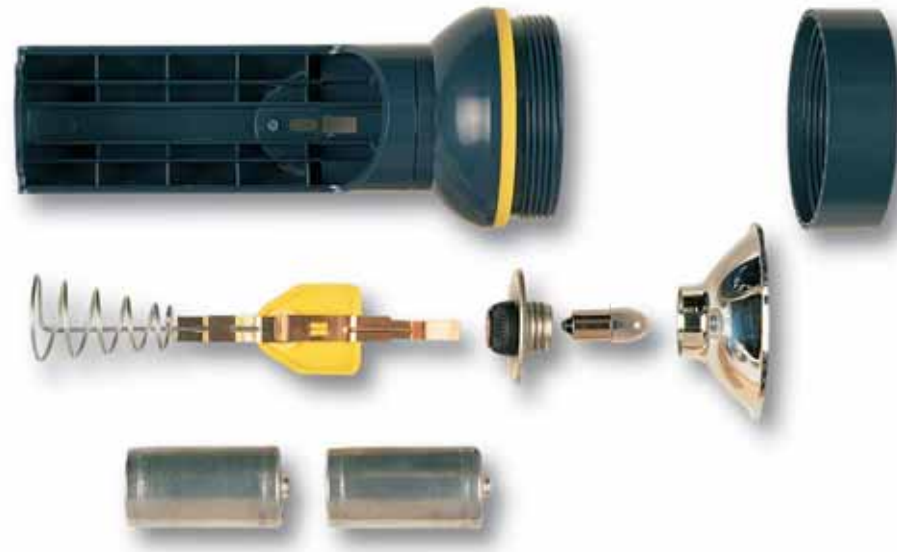
Designing a case

The torch is made in the shape of a tube because a tube is convenient to carry (Pictures 4 and 5). But happily, a tube is also the same shape as the batteries.

The circuit in a torch could be broken accidentally as the torch is carried around. To prevent this, a spring is used to hold the batteries against the bulb. Notice that the spring is metal and is also used as one of the connections to the switch. The bulb is held in front of a shiny dish, the reflector, to make the beam shine forwards.

The circuit is completed when the switch is pushed – connecting the wire leading from the batteries to the wire touching the bulb.

▼ **(Picture 5) These are all the pieces that go into a torch.**



Summary

- **Torches are simple circuits in a cleverly designed case.**
- **Some batteries last longer than others.**
- **Torches with more batteries have more powerful bulbs.**
- **Batteries must be fitted the right way round.**

Weblink: www.science-at-school.com