Key Concept of Levers

You place a long bar onto a fulcrum (pivot point). You apply force in one direction, and the pivot point re-directs the force in another direction. To lift the load on one end, you may need the same weight, or more weight or less weight on the other end… all depending on where the fulcrum is. If you're working with small kids, stick to that basic point, and skip all the details I'm about to give about different classes of levers!

First Class:

There are three classes of lever. A first-class lever has the fulcrum in between the effort and the load (e.g. between you and the weight you're trying to lift). You push down on one end, and the other raises up.

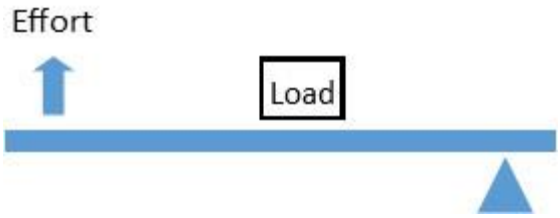
If the fulcrum is in the middle (like on a seesaw or a balance scale), then to lift ten pounds of weight, you need to apply ten pounds of force. There's no mechanical advantage (i.e. the lever doesn't let you lift anything heavier than you could normally lift).

If you place the fulcrum very close to the load, and have a long bar to press down on, this gives you a mechanical advantage – it makes it

easier to lift the load. You might do this if you had a very heavy load to lift, such as using a long lever to pry up a large rock.

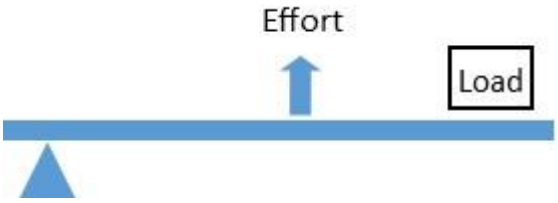
Second class:

The load is in between the fulcrum and the effort. The best example is a wheelbarrow. You lift up on one end, and the fulcrum rests on the ground. Another example is a bottle opener where the fulcrum tucks under the edge of the lid, and one end of the bar rests on the lid.



Third class:

The effort happens between the load and the fulcrum. “A hammer acts as a third-class lever when it is used to drive in a nail: the fulcrum is the wrist, the effort is applied through the hand, and the load is the resistance of the wood. Another example of a third-class lever is the human forearm: the fulcrum is the elbow, the effort is applied by the biceps muscle, and the load is in the hand.” (Source)



A Demonstration:

A see-saw is your ideal demonstration. You can put similar size kids on each end, and they see that it balances out. Then you can put an adult on one end, and see how many kids you need to lift the adult. And then you can try having the adult sit near the middle of the beam on their side, and one kid sit all the way at the end on their side and search for the balance point.