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Fishing Rod Levers

The mechanical advantage you stand to gain depends on which end of the rod you have hold of!

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So which is better... a shorter or a longer rod? Unfortunately there is no easy answer due to the myriad of variables involved. The same length rod will work both for and against you at the same time. The trick is in deciding what the more important priorities are and tailoring rod length to suit those.

Most fishing styles involve so many aspects that it is almost, if not certainly impossible, to arrive at a rod length that is ideal for each and every one. In the interest of simplifying this particular presentation, we'll focus on only one aspect this time out - the mechanical leverage provided by the rod between the fish and the angler.

Background

A fishing rod is a lever. The purpose of a lever is to gain a mechanical advantage of some manner. Where that advantage falls depends upon the location of the fulcrum, load and point of effort. But there is always a price to pay for gaining a mechanical advantage. When you use a small amount of effort to move a larger load, the point of effort must move farther than the load does. Conversely, when you move a load a greater distance than your point of effort moves, you will require an effort that is greater than the load.

From the fisherman's end, a fishing rod represents a ***third order lever***. In this scenario, the **point of effort** (where the fisherman grasps the rod and applies effort) is between the **fulcrum** (the rod butt/gimbal) and the **load** (the fish's weight/power/strength at the rod tip). So, in this order, a small amount of movement on the part of the fisherman will move the load, or fish, a greater distance. Unfortunately, it also requires the fisherman to exert a greater amount of effort than the fish has to!

Now from fish's end, a fishing rod is a ***second order lever.*** In this scenario, the **load** (the fisherman) is now between the **fulcrum** (the rod butt/gimbal) and the **effort** (the fish). So the fish has to move a long way just to move the fisherman a little bit, but he (the fish) has a tremendous advantage in terms of leverage power. Whatever effort the fish produces will be multiplied against the angler.

In short, any time you gain a mechanical advantage in terms of distance, you lose on the effort end. Conversely, if you gain a mechanical advantage in terms of effort/power, you lose on the distance end.

The Formula

Every good custom rod builder should be familiar with the following: ***The load times its distance from the fulcrum, is equal to the effort times its distance from the fulcrum.***

This simple equation will allow you to calculate the power a fisherman can generate against a fish and vice versa, for any given rod length and point of effort. It is of particular help when designing and building offshore trolling and stand-up style rods, but is nonetheless helpful for other rod types as well. It is a physical law that remains accurate across the entire spectrum of rod types.

One More Thing...

Remember that a fishing rod bends under load. A fishing rod that is flexed will adhere to the same laws of physics that a straight lever does, but as the amount of rod flex changes during the fight, and therefore the distance from the tip to the butt changes, the pressure the fisherman can exert and the distance he can move the fish per movement of the rod on his end, is constantly changing.

No Free Lunch

Although the basic illustration in Table 1 does not factor in variables such as different handle configurations or blank actions, it does serve to show the difference in the amount of effort required by the angler to match or overcome any given amount of load at the tip of the rod. In this scenario, the overall lengths of the rods vary, but the point of effort (fisherman's grasp on the rod) remains the same.

Shorter rods attempt to negate some of the mechanical advantage which the fish has over the angler by reducing overall rod length. For any given load, if the point of effort remains in the same location, the shorter rod will exert less pressure on the angler. Conversely, it will allow the fisherman to exert greater pressure on the fish. However, the amount of line the fisherman can recover per movement of the rod, is reduced.

Of course, fishing rods **bend/flex**. As a rod bends under load, the straight line distance from the point of the load to the fulcrum (gimbal) is further reduced. This has the same effect as moving to an even shorter rod which again lessens the pressure on the angler, but it also further reduces the amount of line the fisherman recovers per movement of the rod at his end.

When the rod is not bent, about 12 inches of movement at the point of effort (the fisherman's grasp which is at 30 inches in our illustrations) will result in about 33.5 inches of movement at the tip of the 84 inch long rod, but only about 26 inches of movement on the 66 inch long rod. So the shorter rod will allow the fisherman to move the load with less effort, but will not move the load as far.

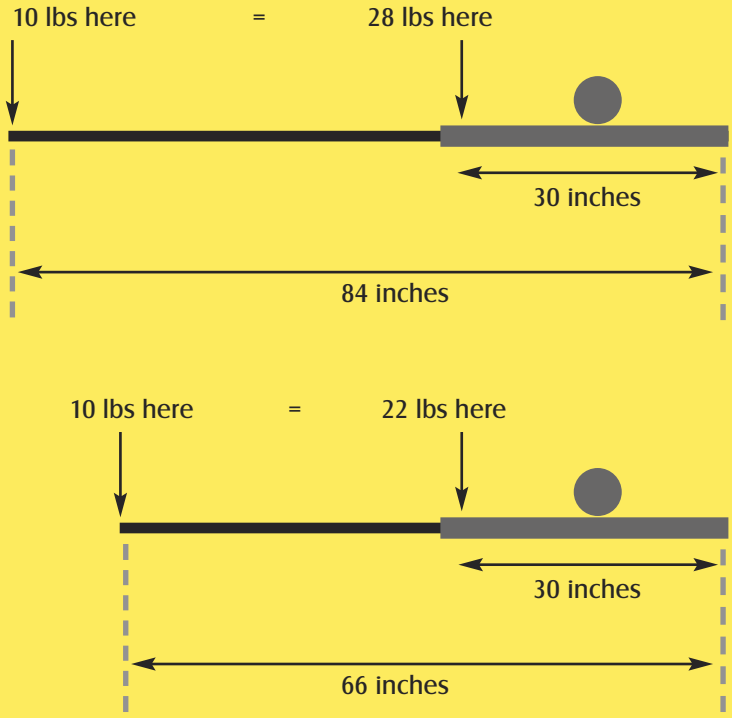
Now let's say that the 66 inch long Stand-Up style rod shown in Table 1, #2 is under load and has deflected enough so that the direct distance from the tip to the gimbal is now only 40 inches. Suddenly our 10 lb load can now be matched by just 13.3 lbs on the part of the fisherman. However, moving the rod 12 inches no longer gains us that 26 inches or so of line recovery at the tip. Instead, it will now only gain us about 18 inches.

So which is better? A longer or a shorter rod? Well, that depends. You have to decide upon which mechanical advantage is the priority for the task at hand and go that direction. You can have one, but not both at the same time. It's unfortunately true - you really can't get something for nothing. ✍

Table 1

Typical 5'6" Stand-Up Style Rod

#1 Length to Power



#2 Effective Length to Distance & Power