# WHEEL RATE

## Wheel Rate

At Noble Bikes we believe wheel rate is one of the most important aspects of a suspension system. Wheel rate is the effective spring rate measured at the wheel. It is defined by the relation between the spring rate and the leverage ratio. When we look at just the spring rate, or just the leverage ratio we forget about the bigger picture.

***What happens at the wheel is ultimately one of the most important aspects of any suspension system.***

## Calculating Wheel Rate

Unfortunately calculating the wheel rate is not always easy. The generic formula to calculate wheel rate is to divide the spring rate by the square of the instantaneous leverage ratio. Because we are dividing by the square of the leverage ratio even small changes in leverage ratio can cause large changes in wheel rate. Coming up with a good wheel rate is a delicate balancing act between spring rate and leverage ratio

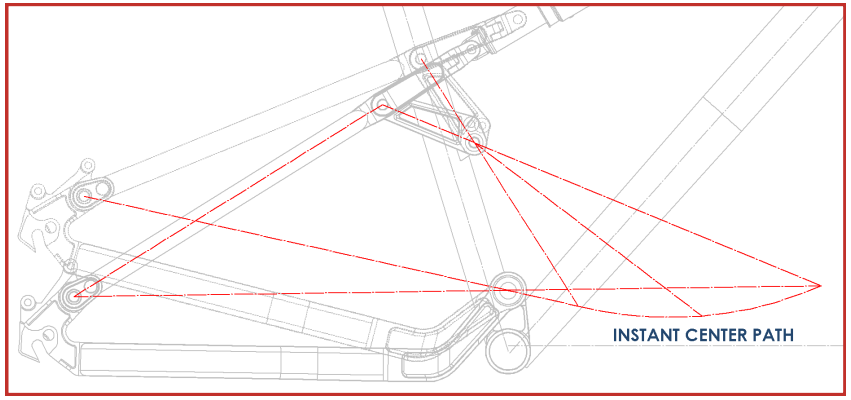
$$Wheel\ Rate = \frac{Spring\ Rate}{(Leverage\ Ratio_{ins})^2}$$

## Spring Rate

First challenge is obtaining accurate spring rate data. The spring rate of an air shock is progressive and defined by the volume of the air canister. We use an RP23 air shock manufactured by Fox. During the development of the F4 Fox provided us with the spring curves available for their shocks. Part 1 of the equation solved by collaborating with the shock manufacturer.

## Leverage Ratio Curve

Second challenge is obtaining accurate Leverage Ratio data. The instantaneous leverage ratio of the F4 suspension system is highly dependent on the instant center of the seat stay. The instant center of the Noble F4 is what allows us to optimize the wheel rate to our preferences. Obtaining accurate instantaneous leverage ratio data is done by using an assembly layout in a parametric CAD system and evaluating the limit of the leverage ratio at various points in the travel. With these data points we can create an accurate leverage ratio curve. Part 2 of the equation solved by understanding the suspension system and using a parametric CAD system.




## So…. How good is the wheel rate of the F4?

We can't really answer that question. The wheel rate of the F4 was optimized is such a way that it is linear to slightly progressive. This results in good small bump compliance, more perceived travel and good bottom-out protection.
Whether the F4 is the right bike for you highly depends on your riding style and suspension preferences. We can talk about the theory behind the frame all day, but in the end it is up to the individual riders to determine if we did a good job or not.