Pulling Teeth

by NICOLA NEMY

My dad lives the bike life. He has ridden more kilometers than I ever will, and in the ’90s he helped build a velodrome in our rural Canadian hometown of a couple thousand people. Every year during cyclocross season, our home would fill with muddy, oddly dressed people crashing on our couches over race weekends. He rides beautiful bikes, and in his late 60s is touring somewhere in Arizona as I write this. You’d like him. He also doesn’t give a damn about gear ratios.

The people who design and produce bikes do, and if that is comfort enough you can stop reading here and I’ll see you next issue. But if you’ve ever wanted to ride faster downhill, or slower uphill, or you’re buying or building a new bike, eventually someone’s going to bring up gear inches, and the least I can do is help you make sense of what they’re saying. It can be enough to send you spinning.

Just a refresher before we start: the largest cog on your cassette in the rear and the smallest chainring in the front make up your lowest gear; smallest in the rear and largest in the front are the highest. When I was learning to drive a standard tractor, I would imagine I was riding a bike to recall that low gearing is for spinning and high gearing is for really laying it down. How low you can go = how slow you can go. Now we can really get geeky.

Calculating gear ratios is easy. All you do is divide the number of teeth on your front chainring by the number of teeth on your cassette cog. That figure is the number of rotations of the rear wheel for every one rotation of your crank. Gear inches just multiplies your gear ratio by the diameter of your tire (not your rim) in inches, which will be different for each wheel and tire combo — you can either measure this, or use an online resource such as bikecalc.com/wheel_size_math. The charts plot chainring teeth along one axis and cog teeth down the other. The last bike I built has a 1x drivetrain with a 34T chainring, an 11–46T cassette, and 27.5in. wheels; I’m running 2.4in tires, which makes the approximate wheelsize 27.8in. So the math for my lowest gear is (34 ÷ 46) x 27.8. That’s about 20 gear inches on the low end, and 86 on the high.

Generally, anything 20 or below is considered low and slow, while 110 and up is pretty high. You might want lower if you’re riding steep, technical terrain on a loaded mountain bike, but drivetrain depending, you’ll lose some gear range at the top end when you drop that low. I don’t really fuss over the high end of my bikes’ gearing though. I ride steel bikes, and I ride them pretty slowly and mostly off-road. Spinning is easier on your knees, and if you strap enough stuff to your bike you’ll descend pretty quickly anyway.

Having lower gears also doesn’t necessarily mean you’ll get up a hill any faster. I’ve found that gears are like the loose Twizzlers I stuff in my bar bag before a ride — I’ll go through every last one no matter how many or how few I’ve got. I bet you’d surprise yourself at some of the gradients you can crawl up on an over-geared bike.

But the ratio range that works for me might not for you. The functionality of the system really kicks in once you have a sense of what 20 gear inches feels like. When I started working in a bike shop, I would test ride bikes on a nearby hill with a grade of 14 percent. As I gasped to the top of that hill in the lowest gear of a couple hundred different bikes, the grimy chart I’d taped above my work stand started to make sense. Different strokes for different folks’ spokes.

The gear inch chart’s applications are wide. If you’re buying or building a new bike, staring at one until your eyes blur is part of the experience. If you own a bike with a gear range you like, use it as a template and customize your drivetrain through your teeth count. If you’re wading into the 1x or 2x debate, you can use a gear inch chart to find repeating ratios. There are redundant gear combinations that could be eliminated by ditching your front derailleur — some triples have more than a dozen. Only having the one chainring does result in larger gaps between cassette cogs, which can feel clunky and throw off your cadence, but I’m just not the sort of rider that bothers.

If you’re planning a trip on your 1x rig, take a look at the average grade of the climbs and consider swapping out your chainring. It’s often the easiest and cheapest mod to make, and you’ll avoid the derailleur compatibility issues that arise with wide-range cassettes. Just keep in mind that two gears on two different bikes with the same inch measurement might feel different because of factors like weight, geometry, tires, or crank length. If you’re comparing two bikes with different crank arm lengths, I’ll point you towards gain ratios, a totally different way of measuring gearing.

The velodrome that my sister and I would sit underneath as kids isn’t there anymore; now it’s a public pool. And today my dad and I ride different bikes in different ways, all with more than the single gear ratio of those velodrome bikes. When we’re lucky, we bike up hills together, even after I cried halfway up a mountain pass on my first tour. He’s the reason I love bikes, and he didn’t pass on my first tour. He’s the reason I love bikes, and he didn’t need to crunch any numbers to show me there are plenty of ways to ride and build them. Paul’s lifelong ride is confirmation that people who design and produce bikes do.

Nicola Nemy has worked as a bike mechanic and a guide for cycling tours all over Canada’s Maritimes, where she also organizes the Monthly Cycle, a social riding and advocacy group for women, trans, femme, and nonbinary riders.