

Praxis “Making Science Fun”

Gears

What affect does changing gears on a bike have?

Materials:

- Any multiple speed bike (3 speed works best).

Procedure: (Remember to be sure to have your parent’s permission and they have the time to watch and help as you do your experiment.)



1. Put the bike in first gear (the one with the largest diameter is first gear) and flip the bicycle upside down.
2. Note the starting position of both the pedals and the rear wheel reflectors.
3. Slowly rotate the pedal forward and count the number of times that the wheel turns fully for one full turn of the pedals (hold the rear wheel slightly so that the wheel doesn't "free spin").
4. Change gears (gearshift is on the handle bar) and repeat step 3.
5. Change gears again to the highest gear (the gear with the smallest diameter) and retest.
6. What does changing gears do to the relationship between the turning pedals and the rotating wheel? (Does it go further? Is it easier to peddle?)

What's happening?

Gears of different sizes are used to either have the wheel rotate with less effort or to have the wheel rotate a greater distance. Which gear, low (larger gear) or high (smallest gear) causes the wheel to rotate with less effort? Which caused it to travel the greater distance?

Extension:

This experiment demonstrates the nature of gears and the concepts of gear ratios to reduce effort or maximize distance travelled. In the early years of bike design gears were not used. Instead the peddles were attached directly to a very large front wheel (same effect as the low gear). These were called penny farthing bikes because at that time the penny was a large coin (about the size of our loonie). In Canada these large pennies, used until 1920, were also a measure of length (the diameter was one inch – the old distance measurement) and weight (100 pennies equalled 1 pound) so that people always had these quick references at hand.

This experimental activity is one of many based on our “Building Things: Simple Machines” Learning Kit. Our teaching kits are loaned out FREE to provide classroom teachers and parents of home schooled children an opportunity to explore Science in interesting ways. Please consider volunteering to speak to a class about any one of our Science learning kits described on our website. We would be most appreciative to hear from you.

Lorne Cooper, Regional Executive Director

PRAXIS, “Making Science Fun”. Contact Praxis at praxis@praxismh.ca, www.praxismh.ca, Tweet or follow us @PraxisMedHat, or friend us on Facebook. Address: c/o 200 7th Street S.W., Medicine Hat, AB, T1A 4K1 Phone: 403-527-5365, Fax: 403-527-6570.