

Bicycle Gear Worksheet

The distance a bike travels for each crank revolution is determined by the following parts: front and rear sprocket size (# of teeth), crank diameter, and the wheel diameter. The sample questions below may be used to help determine distances travel for the gear combinations with each crank revolution.

For our purposes front sprocket sizes would range from 42 to 51 teeth while rear sprocket sizes will range from 10 to 30 teeth.

Let's suppose we are using a size a rear sprocket with 10 teeth and a front sprocket with 51 teeth.

1. How many teeth on the front sprocket does the chain move over when the pedal crank makes one complete revolution? _____
2. When the rear sprocket makes one complete turn, how many times does the rear wheel rotate?

3. How many times will the rear sprocket and rear wheel rotate when the pedal crank has made one full rotation? _____
4. Find the rear wheel distance and hence the bicycle distance when the pedal crank is rotated one time. Work this out for different combinations. _____

Extension

5. What is the distance made by each foot with one complete rotation of the pedal crank? Assume a crank radius of 8 inches. _____
6. Find the rear wheel distance and hence the bicycle distance when the pedal crank is rotated one time. _____
7. Compare the pedal distance to rear wheel or bicycle distance. How many times farther will the rear wheel of the bicycle move compared with the distance the pedals move? _____
8. After calculating various rear and front sprocket combinations, which combination will produce the greatest distance? _____
9. Which sprocket combination will give the shortest distance? _____
10. Which gear combination would you use for climbing a steep hill? Why? _____

11. Which gear combination would you use to generate more speed when going down a hill? Why? _____

Use this worksheet to try different gear combinations in order to compare ratio of wheel distance to pedal distance.

Gear Combinations					
# of teeth in Front Sprocket	# of teeth in Rear Sprocket	Ratio of front to rear sprocket (f/r)	Bicycle distance per Pedal turn $(f/r) * \pi * d$ (d=26")	Pedal distance for each rotation	Ratio of wheel distance to pedal distance
30	10				
30					
30					
30					
30					
40					
40					
40					
40					
40					
51	10				
51					
51					
51					
51					

References

http://go.hrw.com/resources/go_sc/hst/HSTMW521.PDF