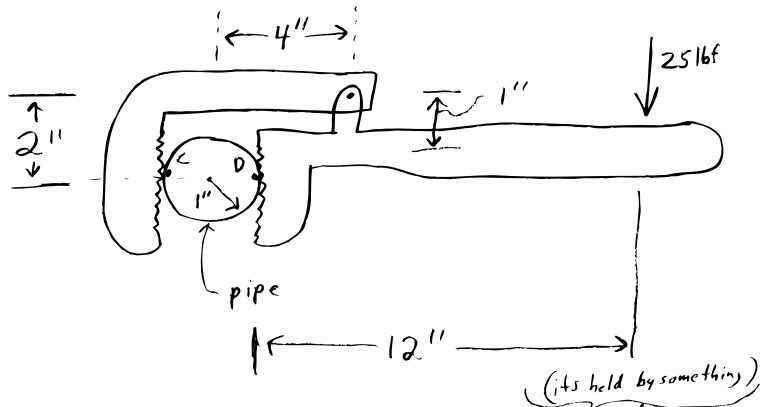1) An idealization of a plumber's pipe wrench is like this

Assuming the pipe doesn't move, and that the wrench doesn't slip, what are the forces on the pipe from the wrench at C and D.

2) A bicycle is balanced in & out of the page (z direction) by forces you should ignore. At the moment of interest the right crank (attaching the crank axle to the pedal) is straight down. What force F is needed to keep the bike from moving if

a) A person sitting on the bicycle pushes the right pedal backwords with a 10 lbf. For a real bike is F>0 or F<0?

b) A person standing next to the bicycle pushes back on the right pedal with a force of 10 lbf. For a real bike is F>0 or F<0?

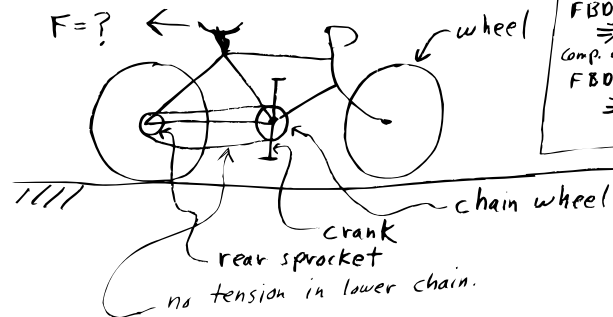Answer in terms of   Try it on a real bike.

r_w = wheel radius r_s = rear sprocket radius

r_p = crank radius to pedal

r_c = chain wheel radius

HINTS

FBD of crank & chainwheel ⇒ chain tension.

FBD of rear wheel ⇒ ground force forward comp. at rear wheel

FBD of whole bike ⇒ F

F=?

wheel

chain wheel

crank

rear sprocket

no tension in lower chain.