























Negative Mechanical Advantage The force provided by each quadriceps for this stance is more than 5x the person's weight









Question Every joint in your body has negative mechanical advantage. Are there any beneficial tradeoffs?





Which one is a digger, which one is a jumper?











T(4.0 cm) = (540 N)(35 cm)

 $T_{\rm max} = (100 \times 10^6 \text{ N/m}^2)(1.3 \times 10^6 \text{ N/m}^2)$









Your legs are pendulums. Your stride frequency doesn't vary much. Walking faster means a larger amplitude—you take longer strides.

Experiment Walking quickly, take 10-20 steps, and measure the time. Walking slowly, take 10-20 steps, and measure the time.





































Drag force

Direction Opposite motion

Size Proportional to area Proportional to the square of the speed





Terminal Speed



After a certain point, speed is constant.



Skydiving, Man & Mouse

A man jumps from an airplane and falls with his body horizontal. He holds his arms and legs tight to his body as he falls. What is his terminal velocity? Assume the 75 kg skydiver's body has dimensions 1.8 m long, 0.40 m wide.

Now, repeat the calculation for a mouse. Assume the mouse has a mass of 20 g and is 7 cm long and 3 cm wide.





