

Rolling Without Slipping

An object undergoing rolling without slipping is in pure rotation about an axis through an instantaneous point of contact with the floor.

The development of the wheel which led to the chariot was a revolutionary development in warfare in the ancient Middle East.

Let us assume that a group of physics students have made the first wheel for a chariot using an equilateral triangle as shown below with the shaft attached in the middle. We will now analyze its motion.



Let us now look at an improved design using a rectangle.



An even better design with a six sided polygon



An infinite sided polygon



This is the wheel!!!

Because the wheel is in pure rotation about point P, the speed of the center of mass is related to the angular speed about P by our rotation equation:

This is called the no-slip condition.