Dry friction is the force that resists relative lateral motion of two solid surfaces in contact. Tribology: science of friction (and its consequences, like wear, tear, etc.) and ways to reduce it.

Amonton's laws of friction:
1. Friction is proportional to applied load.
2. Friction is independent of contact area.

Coulomb: Kinetic friction is independent of velocity.
All these together is known as Coulomb friction.
There are important limitations of this model of friction, and this is an active research area with particular importance in mechanical engineering & nanotechnology.

Friction is a tangential force resisting relative motion between two bodies that are in physical contact. Friction is always present in any sliding contact and is proportional to the normal force and the coefficient of friction for the surface in motion. The ratio of proportionality between friction force and the normal force is known as the coefficient of friction.

Friction force can be calculated as:
\[ F_f = \mu_s N \]
where \( F_f \) is the friction force, \( \mu_s \) is the coefficient of static friction, and \( N \) is the normal force.

Imagine a scenario where we are trying to push a stationary object. The friction force will try to oppose the motion.

1. Imagine which way the object would move if there were no friction. Find out how the surfaces would slide with respect to each other.
2. Friction's direction will be opposing that motion.

If the object is on a ramp, the angle \( \theta \) is gradually increasing. At what angle would the object start sliding?

Note that we assumed that the frictional force is toward the center of the circular track. And we find that when the friction is not enough (or is not present), the car could move "outward". Hence, we can conclude that our assumption makes sense; friction is opposing the direction of the motion that the car would experience were the friction absent.

Q: If we wanted to increase the safe speed, what could we do? (1) increase \( g \): not likely on the surface of the Earth. (2) increase \( \mu_s \): this is an active R&D topic, but it is hard to increase it too much (already the tires used on our cars have come close to the theoretical limits). (3) increase \( R \): if the geometry of the path allows for it, we can build roads with large radius of curvature. But if that is not the case, what can we do?

Answer: Banked road!