



CHAPTER 12: FRICTION

MODULE 2/4, CLASS 8

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Types of Friction

STATIC FRICTION : is the friction exerted on an object at rest.



SLIDING Friction: is the friction exerted when an object slides over surface with a working fluid in between the two bodies.



ROLLING Friction: is the friction exerted when an object rolls over another surface.



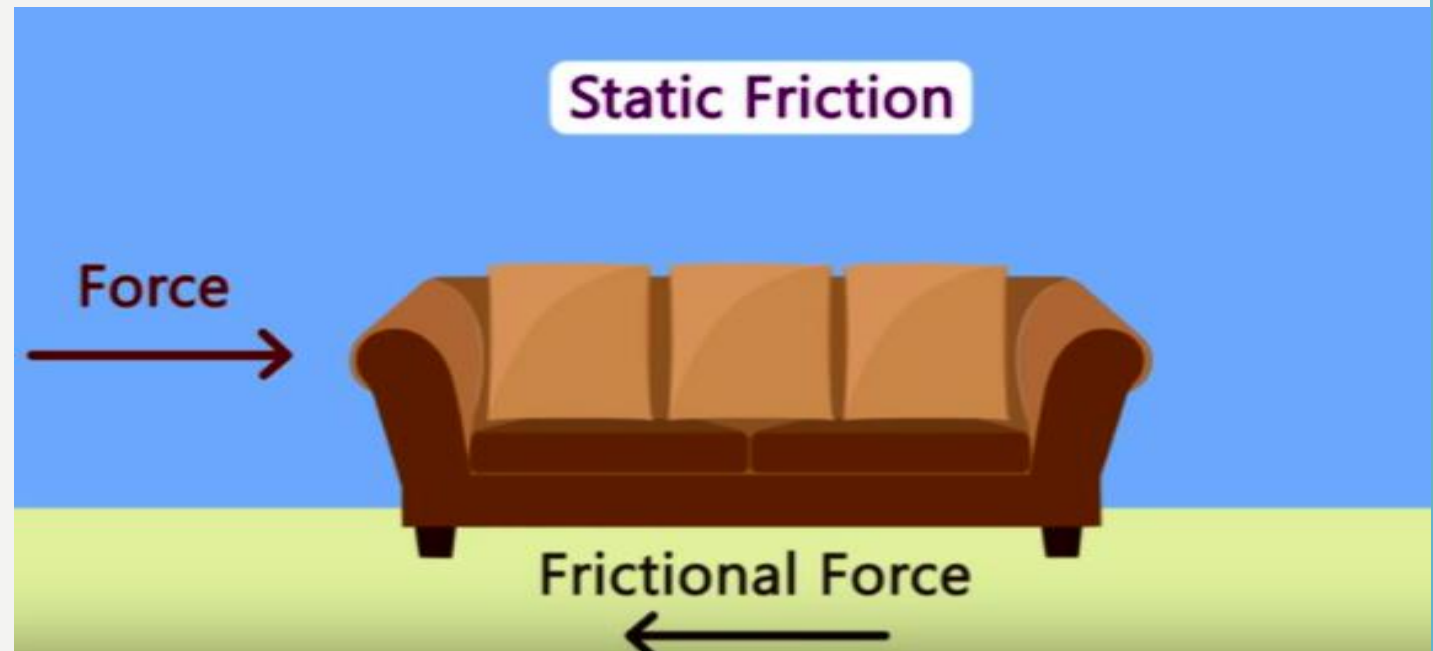
STATIC FRICTION : is the friction exerted on an object at rest.

- It depends on the roughness between the two surfaces
- Even if a person may not be able to lift an object, he or she can still pull or push it
- Force required in this case is @ 8-10% of that required for lifting

Static Friction



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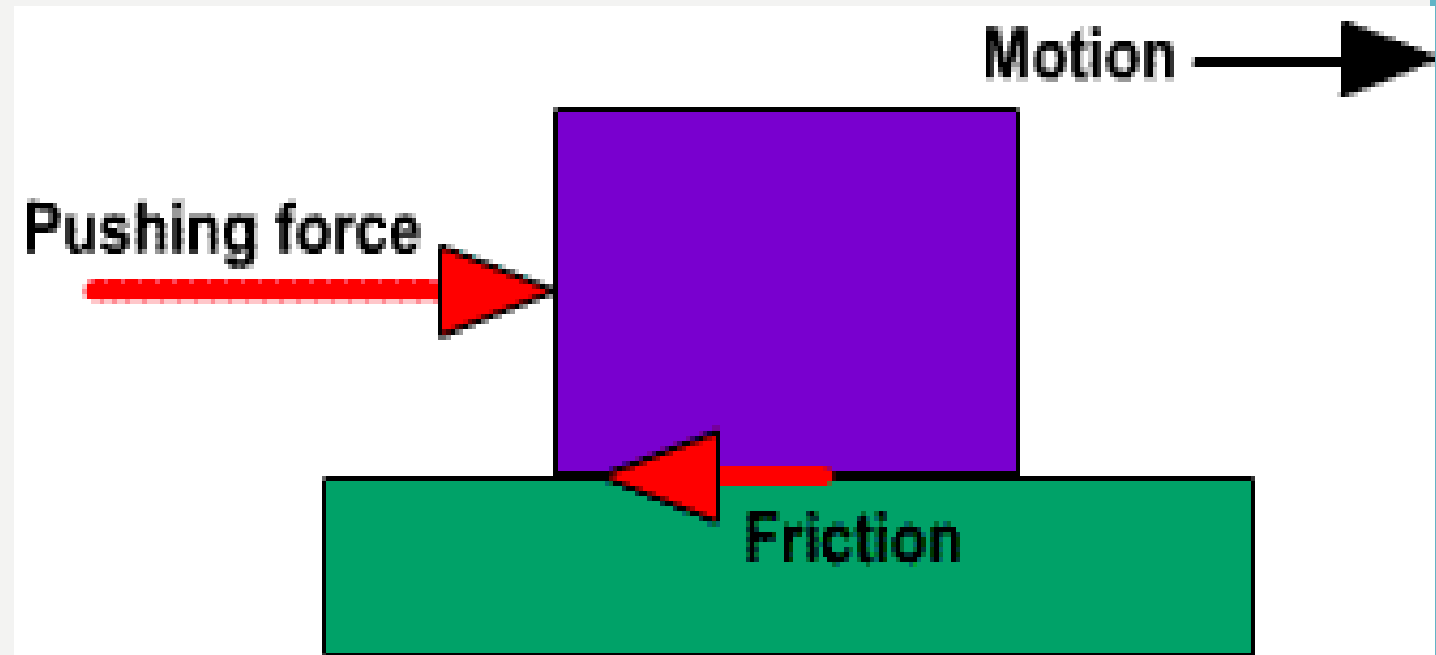
Sliding FRICTION : is the friction exerted when an object slides over surface with a working fluid in between the two bodies.

- The working fluid can be moisture on the surface
- Speed of motion prevents Static friction
- Force required in this case is @ 1-2 % of that required for lifting

Sliding Friction



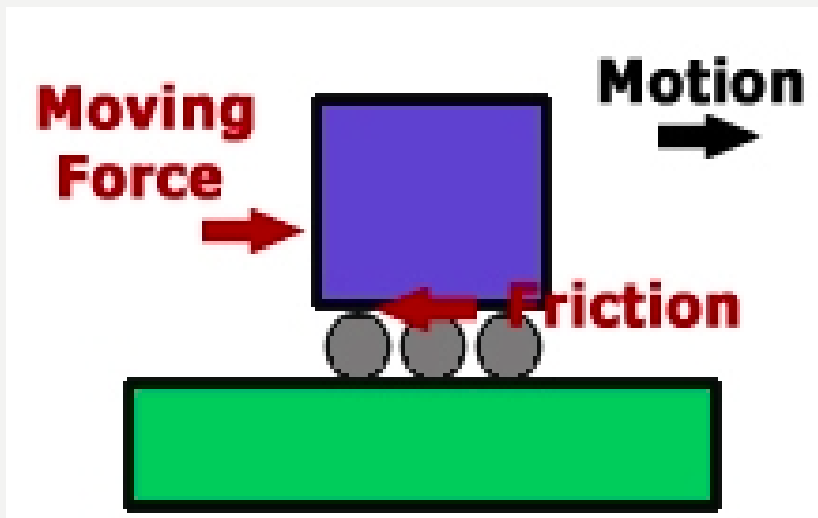
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Rolling Friction



When one body rolls over the surface of another body, the resistance to its motion is called the rolling friction.

- Rolling reduces friction. It is always easier to roll than to slide a body over another. That is the reason it is convenient to pull the luggage fitted with rollers. Can you now understand why wheel is said to be one of the greatest inventions of mankind?
- Since the rolling friction is smaller than the sliding friction, sliding is replaced in most machines by rolling by the use of ball bearings.
- Force required in this case is @ 0.01 – 0.1 % of that required for lifting. Depending on roughness / smoothness and irregularity / balancing of the ball
- Common examples are the use of ball bearings between hubs and the axles of ceiling fans and bicycles.
- Spherical Ball or roller bearings are used in machines to prevent Static & Sliding Friction.

How can we identify Frictional Forces?

- The force required to overcome friction at the instant an object starts moving from rest is a measure of static friction. On the other hand, the force required to keep the object moving with the same speed is a measure of sliding friction
- When the box starts sliding, the contact points on its surface, do not get enough time to lock into the contact points on the floor. So, the sliding friction is slightly smaller than the static
- Sliding FRICTION is slightly less (<) than Static FRICTION
- Rolling FRICTION is slightly less than Sliding & Static FRICTION



You have to push on the box to keep it moving

Advantages of Friction



1. Light a Match



2. Write with a pen/chalk



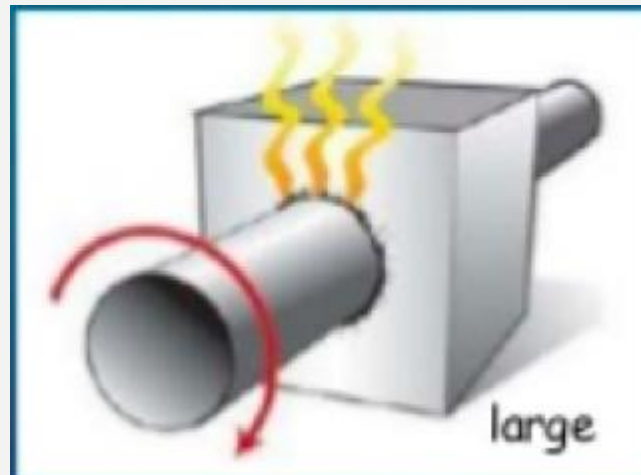
3. Fix a nail in the wall



4. Gymnast rod surface

Disadvantages of Friction

- Unless a force is constantly applied Friction will slow all motion to a stop eventually.
- It is impossible to completely get rid of friction, but it can be reduced.
- The friction between a shaft (the long rod in the picture) and an outer part of a machine in bush type bearings produces a lot of heat.
- Friction can be reduced by placing ball bearings between the shaft and the outer part.



THANK YOU

END OF MODULE 2/4