

Do Now:

What is “friction”?

Forces



What is a FORCE?

A force is a push or pull that acts on an object. It can cause a resting object to move or a moving object to change direction.

The SI unit of Force is the **Newton (1 kg m/s^2)**. The force needed to move a 1 kg object 1 meter/sec, every second. (You exert about one Newton of force when you lift a small lemon)

The Nature of Forces

We use arrows to show the amount of force acting on an object. These arrows also show the direction of the force.



Forces may cancel each other and produce no net force.

NET FORCE = the total of all of the forces working on an object

A Adding forces



B Subtracting forces



C Equal and opposite forces



Unbalanced Forces

Unbalanced forces acting on an object result in a net force and cause a change in the object's motion.



Unbalanced Forces in the Same Direction
When two forces act in the same direction, the net force is the sum of the two individual forces. The box moves to the right.



Unbalanced Forces in the Opposite Direction
When two forces act in opposite directions, the net force is the difference between the two individual forces. The box moves to the right.

Balanced Forces

Balanced forces acting on an object do not change the object's motion.



Balanced Forces in Opposite Directions

When two equal forces act in opposite directions, they cancel each other out. The box doesn't move.

What do you think?

You pass by a construction crew building a home in your neighborhood. You look up and see a worker nailing shingles onto a new roof. What balanced forces prevent the worker from sliding off?



Friction

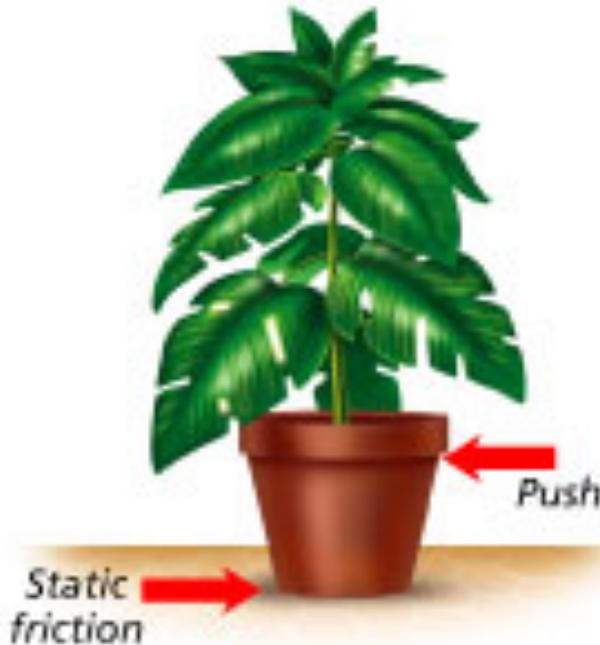
Friction is the force that opposes the motion of objects as they touch each other or move past each other.

There are 4 types: static, sliding, rolling, and fluid friction.

Static Friction

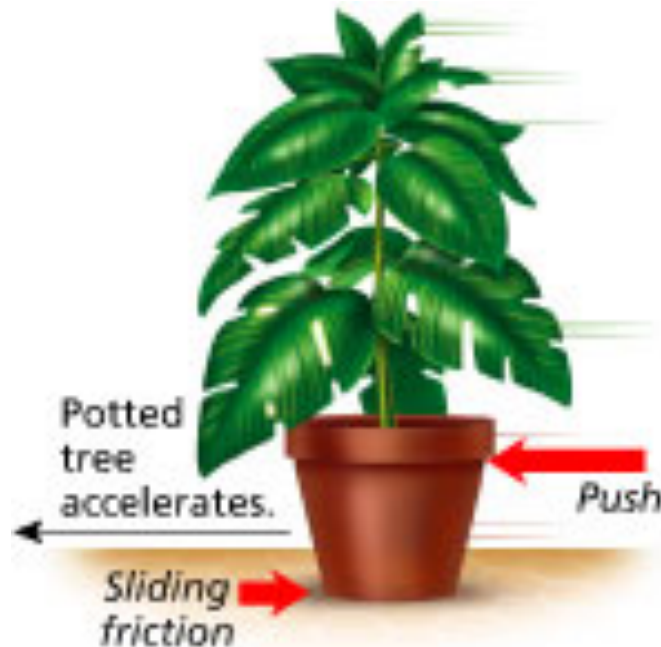
Always acts in the opposite direction of the applied force

If the forces are equal, the plant will not move. You must apply a greater force in order to overcome friction.



Sliding Friction

Opposes the direction of motion as an object slides over a surface. The force of sliding friction is less than static friction because less force is needed to keep an object moving than trying to start the object moving.



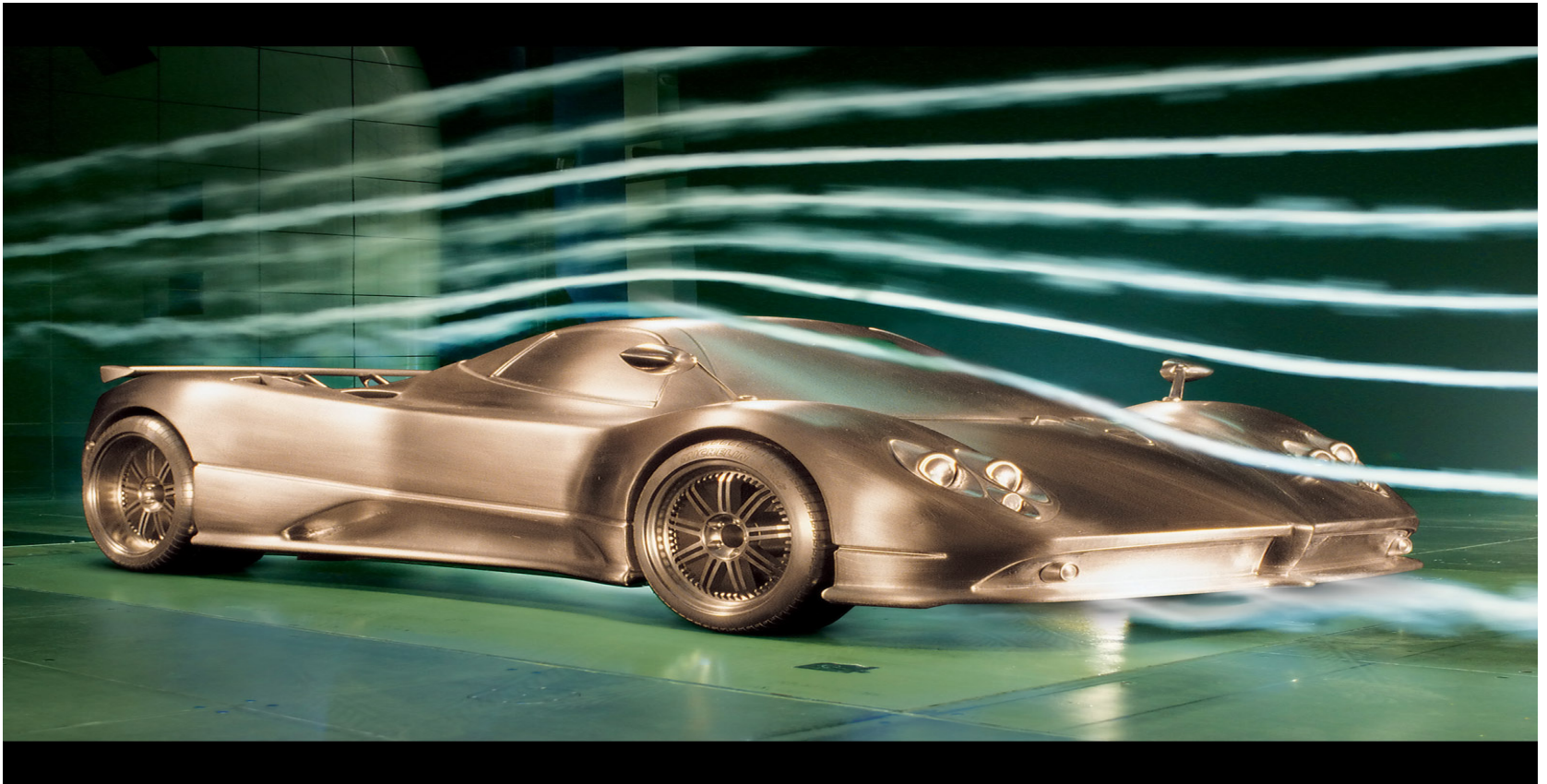
Rolling Friction

The force that works on rolling objects.
This force is much less than sliding friction and is usually due to the use of ball bearings.



Fluid Friction

Opposes the movement of an object through a fluid. Submarines, airplanes, and cars experience fluid friction. However, the faster the object moves, the greater the fluid friction, so aerodynamic shapes are extremely important.



Closure:

What direction is the force of friction?