

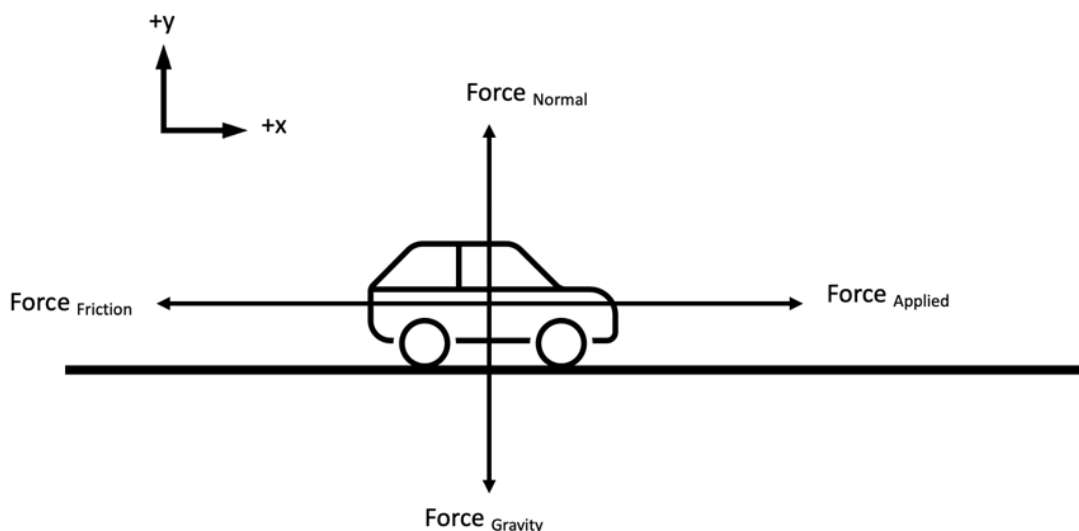
## Free Body Diagrams (FBDs):

Free body diagrams (FBDs) are used in physics to visualize situations that we are modeling. FBDs show the relative magnitudes and directions of forces acting on one or more objects.

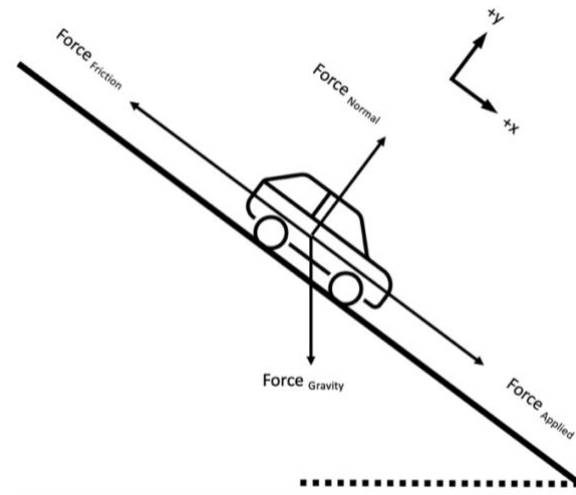
### Rules/Tips:

- Forces are represented as arrows that go from the center of the object and point outwards.
- Larger arrows represent larger magnitudes.
- Look for balanced and unbalanced forces. Balanced forces are equal in size and opposite in direction, resulting in no change of motion. Unbalanced forces are not equal in size and opposite in direction and result in a change of motion.
- Define the coordinate system. Depending on the problem, you may use x and y, horizontal and vertical or North South East West coordinate systems. Sometimes, it is beneficial to rotate these coordinate systems to simplify the problem.

For example, this is a FBD of a car driving down a flat road:



The coordinate system could be rotated if instead of a flat road the car was driving down a hill or ramp:



Note: The force of gravity always acts downwards, perpendicular to the Earth's surface.