**Forces**

**Force:**

**There are 2 types:**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: results when interacting objects are not in physical contact, but are able to exert a push or pull despite being physically separated.

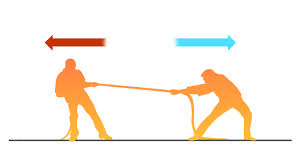
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: results when 2 interacting objects are physically touching each other

**These Include**:

* **G**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **E\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **M**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**These Include**:

* **F**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **A**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **T**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **N**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **A**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **S**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[](http://www.google.com/imgres?imgurl=http://www.bbc.co.uk/staticarchive/a63396a2cea7b5d87ff7c8ae8712928ca602c3a0.gif&imgrefurl=http://www.bbc.co.uk/bitesize/standard/physics/transport/forces_at_work/revision/1/&h=307&w=546&tbnid=JeeOjGRGMqz8gM:&zoom=1&q=forces&docid=1UbCv2NL_zOKgM&ei=sHGtVOTICOrisAS3k4L4Bg&tbm=isch&ved=0CCcQMygJMAk&iact=rc&uact=3&dur=4728&page=1&start=0&ndsp=18)

**Contact Forces**

|  |  |  |
| --- | --- | --- |
| Force | Definition | Example |
| **Frictional** | Force exerted by a surface as an object moves across it. There are 2 types: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Frictional force opposes the motion of an object (slows the object down) | [http://t3.gstatic.com/images?q=tbn:ANd9GcQf4_xZ8thJNDeHsLihR0frKfQk91j-rA1EZTXFBBCxxH9QIfiM:magazine.ufl.edu/wp-content/uploads/2010/10/Illustration_feature.png](http://www.google.com/imgres?imgurl=http://magazine.ufl.edu/wp-content/uploads/2010/10/Illustration_feature.png&imgrefurl=http://magazine.ufl.edu/2010/10/the-harrowing-tale-of-the-abandoned-scooter/&h=370&w=540&tbnid=FbOj7ENcZYyRjM:&zoom=1&q=car%20rolling%20down%20a%20hill&docid=Z0BrGCdva59BqM&ei=Cs6uVOXDI4q0sASzsIHQCQ&tbm=isch&ved=0CD0QMygWMBY&iact=rc&uact=3&dur=596&page=2&start=11&ndsp=16)A car slowly rolling and eventually coming to a stop. |
| **Applied** | A force applied to an object by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | [http://t1.gstatic.com/images?q=tbn:ANd9GcSsPvVlpTM5LcnLwXuyNBvugPvTPibXEcAzH9hxnyT06ar50Rv7PQ:images.tutorvista.com/cms/images/83/kicking-of-soccer-ball.PNG](http://www.google.com/imgres?imgurl=http://images.tutorvista.com/cms/images/83/kicking-of-soccer-ball.PNG&imgrefurl=http://physics.tutorvista.com/forces/contact-force.html&h=400&w=275&tbnid=B45ddvduqvAGZM:&zoom=1&q=applied%20force%20example&docid=t4mOz6ZS38NB1M&ei=poSuVNn1GszHsQTwwYBw&tbm=isch&ved=0CCIQMygGMAY&iact=rc&uact=3&dur=2110&page=1&start=0&ndsp=20) |
| **Tension** | The force that is transmitted through a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when it is pulled tight by a force acting from opposite ends. | [http://t2.gstatic.com/images?q=tbn:ANd9GcSUNxzYck84vnr4xdilUuRE0dxigyyYZ75lLetm2y1EBmWtKawa:media.ehs.uen.org/html/PhysicsQ2/Tension_01/tension.jpg](http://www.google.com/imgres?imgurl=http://media.ehs.uen.org/html/PhysicsQ2/Tension_01/tension.jpg&imgrefurl=http://shanelygarcia-stem.blogspot.com/2014_01_01_archive.html&h=260&w=528&tbnid=JRziuLAWqofcNM:&zoom=1&q=tension%20force%20example&docid=9qaTC235A_UKoM&ei=O4SuVJefE7iJsQT_s4LwDA&tbm=isch&ved=0CEQQMygYMBg&iact=rc&uact=3&dur=2419&page=2&start=18&ndsp=25) |
| **Normal** | A support force exerted upon an object that is in contact with another \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | * Sitting on a chair * A book resting on a desk   [http://t0.gstatic.com/images?q=tbn:ANd9GcQJlQVVjZk8l5qzXu3mNyaSNRxlvrxnwCTEPxFlihYZljPOobGD:sciencecity.oupchina.com.hk/npaw/student/glossary/img/normal_force.jpg](http://www.google.com/url?sa=i&rct=j&q=normal+force+example&source=images&cd=&cad=rja&uact=8&ved=0CAcQjRw&url=http://topharleydavidson.com/images/disclaimer-423-our-student-stories-200-x-243-38-kb-jpeg.html&ei=wIWuVLvnCvO1sQTDw4DYAw&bvm=bv.83134100,d.cWc&psig=AFQjCNECLxqUGpHECeyQaXDZuz53PamB0w&ust=1420810020313616) |
| **Air Resistance** | A special type of frictional force that acts upon objects as they travel through\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the air. It is often observed to oppose the motion of an object. | [http://t3.gstatic.com/images?q=tbn:ANd9GcQ3iUpd9whCzakhLSIkDDXxOUK7_d8XQshqwPT8lpduQJNSM9Wu:https://playingintheworldgame.files.wordpress.com/2015/01/parachute-clipart-002-parachute_01.png](http://www.google.com/imgres?imgurl=https://playingintheworldgame.files.wordpress.com/2015/01/parachute-clipart-002-parachute_01.png&imgrefurl=https://playingintheworldgame.wordpress.com/category/humor/&h=312&w=325&tbnid=ceAzZoGbiqpItM:&zoom=1&q=cartoon%20parachute%20example&docid=EFFjCeusFZSMYM&ei=hoauVIGdF-jjsASU4oLIDA&tbm=isch&ved=0CC4QMygSMBI&iact=rc&uact=3&dur=453&page=1&start=0&ndsp=22) |
| **Spring Force** | the **force** exerted by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ upon any object that is attached to it. | [http://t2.gstatic.com/images?q=tbn:ANd9GcTZvfrq8ks9SBj1pvTHISz6S6tRrA05h-0QC9147yhFXXq6b8MHMQ:catalog.miniscience.com/catalog/Mechanics/LEVER/Spring_Scale_6_m.jpg](http://www.google.com/imgres?imgurl=http://catalog.miniscience.com/catalog/Mechanics/LEVER/Spring_Scale_6_m.jpg&imgrefurl=http://catalog.miniscience.com/catalog/Mechanics/Lever.html&h=202&w=239&tbnid=J-yu1dxM6-K_lM:&zoom=1&q=easy%20example%20of%20a%20spring%20force&docid=QyAZtr_8_Q0ZZM&ei=DMyuVMSuN4vasATi3YGwBg&tbm=isch&ved=0CFgQMygxMDE&iact=rc&uact=3&dur=336&page=4&start=47&ndsp=13) |

Which two forces oppose the motion of an object? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Oppose means - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Equation to know:**

**Speed (or velocity)**

Speed = distance

time

Example: What is the speed of a car that travels 120 miles in 2 hours?

Speed = ?

Distance = 120 = 120 miles

Time = 2 hours 2 hours

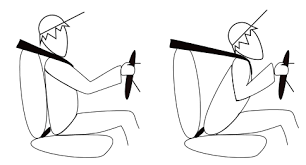
**What is the difference between weight and mass?**

* mass and weight are different.
* The [mass](http://simple.wikipedia.org/wiki/Mass) of an object is a [measure](http://simple.wikipedia.org/wiki/Measure) of the amount of [\_\_\_\_\_\_\_\_\_\_\_\_](http://simple.wikipedia.org/wiki/Matter) in the object.
* [Weight](http://simple.wikipedia.org/wiki/Weight) is a measure of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* In other words, weight is how hard gravity pulls on an object.
* **Mass *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*stays the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* **Weight changes based on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Newton’s Laws**

**Newton’s 1st Law**: Law of INERTIA: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* It is directly related to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* If mass increases, then inertia \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. If mass decreases, then inertia \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Example: When traveling in a car that stops abruptly, the car will stop moving, but your body will keep moving forward unless acted upon by another force – such as a ***seatbelt!***

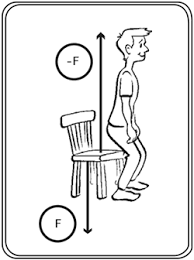
[](http://www.google.com/imgres?imgurl=http://figures.boundless.com/16882/full/seatbelt.png&imgrefurl=https://www.boundless.com/physics/textbooks/boundless-physics-textbook/the-laws-of-motion-4/newton-s-laws-46/the-first-law-inertia-236-10947/&h=261&w=484&tbnid=oawNw-bBrr7lEM:&zoom=1&q=newton's%20law%20of%20inertia%20examples&docid=v_dGOmESpOA9PM&ei=81e1VIb0FLXasASRlIGwDQ&tbm=isch&ved=0CDwQMygVMBU&iact=rc&uact=3&dur=2900&page=2&start=20&ndsp=25)

**Newton’s 2nd law:** (***How fast I get faster***!)

* Acceleration = force/mass OR
* Force = mass x acceleration

**Newton’s 3rd law:**

* For every action there is an **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** BUT\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reaction.
* EXAMPLE: If I sit on a chair with a force of 200 N the chair is pushing back up on my with an equal and opposite force of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

[](http://www.google.com/url?sa=i&rct=j&q=newton's+third+law&source=images&cd=&cad=rja&uact=8&ved=0CAcQjRw&url=http://sweb.cityu.edu.hk/sm2203/oldclass2007/lab11/toc03/&ei=bVW1VKuTF_a_sQSA-oGgDw&bvm=bv.83339334,d.cWc&psig=AFQjCNF1U2IxfbRfdtDcz8y0iADVBm0i3Q&ust=1421256338736932)

* If a batter hits a ball with 20N of force an ***EQUAL*** and ***OPPOSITE*** reaction would be a force of \_\_\_\_\_\_\_\_\_\_ on the batters bat \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the direction of the balls motion.

**Vocabulary to Know:**

|  |  |
| --- | --- |
| **Word** | **Definition** |
| **Force** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **Inertia** | A body in motion will remain in motion and a body at rest will remain at rest UNLESS…. \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **Acceleration** | An increase in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  [http://t0.gstatic.com/images?q=tbn:ANd9GcTtlVJ1ndvhdYiNqXfwhGlU5ywayU8EbAgcq02aW2dHXm_4UVcR:road2animate.files.wordpress.com/2010/06/screen-shot-2010-06-26-at-9-49-24-pm.png](http://www.google.com/imgres?imgurl=http://road2animate.files.wordpress.com/2010/06/screen-shot-2010-06-26-at-9-49-24-pm.png&imgrefurl=http://road2animate.wordpress.com/category/animation-articles/&h=401&w=681&tbnid=-6ToOg52pmm6gM:&zoom=1&q=acceleration%20cartoon&docid=6UrcOFpcBpRouM&ei=L5u2VPLgGMnasATB34CYBg&tbm=isch&ved=0CA0QMygFMAU4yAE&iact=rc&uact=3&dur=1384&page=13&start=196&ndsp=16) |
| **Friction** | The force exerted by a surface as an object moves across it. It \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the motion of the object and slows it down. |
| **Weight** | The force exerted on an object by gravity.  Formula : Weight = \_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Weight changes depending on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |
| **Mass** | The amount \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Always stays the SAME!!  EXAMPLE: Mrs. Uhrlass has the same mass on Earth as she has in space!!! |