

PHYSICS 151 READING

ASSIGNMENT FOR SEPTEMBER 21

SECTIONS 4.5 TO 4.7

Please notice that this file is two pages long.

4.5 - What Do Forces Do?

- This whole section's goal is to stop you thinking like Aristotle - that objects are naturally at rest.
- Forces cause acceleration - It's a simple statement, but it can be hard to understand what it means.
- Mass - the amount of matter in an object.
- The acceleration is directly proportional to the net force and inversely proportional to the mass.
- Inertia - This is usually introduced when doing the First Law (that's how I'll do it in class), but the definition here is fine.

4.6 - Newton's Second Law

- $\vec{\mathbf{F}} = M\vec{\mathbf{a}}$ is just the equation form of the concepts from the previous section. *Only true when a single force acts on an object.*
- For multiple forces: $\sum \vec{\mathbf{F}} = M\vec{\mathbf{a}}$. This is the only equation you need for this chapter and next.

- The unit of newtons is a unit simplification. $1 N = 1 kg \cdot m/s^2$, so you *have* to use kilograms, meters, and seconds.

4.7 - Free-Body Diagrams

- Free-Body Diagram - A picture of the forces acting on an object
- They are quite useful, so read the Tactics Box 4.3 very carefully.