



IDX G9 Physics S
Study Guide Issue S1 Monthly 2
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4-2:

Scales

- Spring force is a restoring force that is the push or pull a spring exerts on an object
 - A spring scale measures weight, not mass
 - In equilibrium: $F_{sp} = F_g$
 - With a constant acceleration: Upward: $F_{sp} > F_g$
Downward: $F_{sp} < F_g$
 - Special case: free fall $\rightarrow F_{sp} = 0N$
 - Weightlessness does not mean that an object's weight is actually zero, but means that there are no contact forces pushing up on the object and its apparent weight is 0
- The force exerted by the scale is called the apparent weight

Drag Force and Terminal Velocity

- Ideal case: no air resistance
- In actuality: drag force \rightarrow the force exerted by a fluid on the object moving through the fluid
- Drag force depends on:
 - 1. Motion of the object

- 2. Properties of the object
- 3. Properties of the fluid
- Terminal velocity: The drag force on an object increases as its velocity increase. When the drag force increases to the point that it equals the force of gravity, the object will no longer be accelerated
- Parachuting: A parachutist will have two different terminal velocities. Before opening the parachute & after it is opened

4-3:

- Interaction pair
 - Forces always come in pairs – $F_{A \text{ on } B}$ and $F_{B \text{ on } A}$
 - Opposite directions and equal magnitude
 - Also called: action-reaction pair of forces
- Newton's Third Law
 - The force of A on B is equal in magnitude and opposite in direction of the force of B on A
 - $F_{A \text{ on } B} = -F_{B \text{ on } A}$

1-1:

- Physics is the study of matter and energy and their relationships
 - Science – natural science, social science
- Unit
 - SI system: Also called international system of units is a base 10 system of measurement that is the standard in science
 - Mass: kg
 - Length: m
 - Time: s
 - Temperature: kelvin
 - Substance: mole
 - Electric current: ampere

- Luminous intensity: candela
 - Derived units: Created by combining the SI units
 - $N = \text{kg} \cdot \text{m/s}^2$
 - $J = \text{kg} \cdot \text{m}^2/\text{s}^2$
- Dimensional Analysis
 - The method of treating the units as algebraic quantities
 - Use units to check the work
 - Use dimensional analysis in converting units
- Scientific Notation
 - Digits $\times 10$ to a power
- Measurements
 - All measurement has some limit to their precision. Only estimate one digit further than the level of precision inherent in the instrument
 - Estimated digit (Uncertain Digit): The last digit given for any measurement
- Significant Figures
 - The valid digits in a measurement are called significant digits
 - Last digit in a measurement = estimated/uncertain digit
 - The significant digits: all the measured digits + one estimated digits
 - Show how precise the measurement is
 - Non zero digits, zeros between other digits, trailing decimal zero (allowed)
 - Leading zero (not allowed) Trailing zero (may or may not)
- Adding & Subtracting
 - Deform the operation
 - Round the results to have as many decimal places as the measured number with the smallest number of decimal numbers