Newton's second law of motion states that an object's acceleration is directly proportional to the net force acting on it and inversely proportional to its mass, expressed by the formula F = ma (or F_net = ma). This means that a greater force produces a greater acceleration, while a greater mass produces a smaller acceleration, with the acceleration always occurring in the same direction as the net force.

Key Concepts

- **Force (F):** A push or pull on an object.
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- **Mass (m):** The amount of matter in an object; it also represents the object's inertia.
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- **Acceleration (a):** The rate at which an object's velocity changes.
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- **Net Force:** The sum of all forces acting on an object.