

A. Definitions:

Drag force (53b, 56)

Impulse (54, 54b)

Mass Ejection Rate (54b, 56)

Momentum (54, RS IV)

Newton (52)

Specific Impulse (54b)

Terminal velocity (56b)

Thrust (of a rocket) (50, 54b, 56)

Total force (42, 48, 49)

B. Discoveries:

1. Newton's First Law: ("Law of Inertia" on pages 30, 48, 49, #3 on RS III) -How can the acceleration of an object be predicted if the vector sum of all the forces acting on it is zero?
2. Newton's Second Law:
 - a. The direction of an object's acceleration is always the same as the direction of the _____ on the object. (34R, 40, 47, 48, #4 on RS III)
 - b. An object's acceleration is _____ly proportional to the _____ force acting on _____. (49)
 - c. Given the mass of an object and the vector sum of the forces acting on it, how can we predict its acceleration? (51, 52) $\mathbf{a} = \underline{\hspace{2cm}}$
 - d. If the mass is in *kilograms* and the acceleration is in _____ then "F" must be in _____. (52)
 - e. If the mass is in *grams* and the acceleration is in _____ then "F" must be in _____.
 - f. If the force is in pounds and the acceleration is in ft/s^2 then the _____ must be in _____.
3. How do we predict the acceleration of a sliding object when it is coasting to a stop on a level surface? $\mathbf{a} = \underline{\hspace{2cm}}$ -How can we predict its sliding distance? $\mathbf{D} = \underline{\hspace{2cm}}$ (52)
4. Near the earth's surface, how much gravitational force is exerted by the earth on any kilogram of matter? (7, 32, 39, 43, 47, 50, 53) _____ or _____ How can we determine the gravitational field strength by observing the motion of a freely-falling object?
5. How are mass and weight related? -How can one be calculated from the other? (6,32,39,43,47,50,53)
6. How can artificial gravity be created, and how can its strength be predicted? (56b)
7. Impulse and Momentum Law: _____ = _____ (54, 54b, 56)
8. Newton's Third Law: (Interaction Law)
 - a. Whenever object "A" exerts a force on object "B", we know that B must simultaneously exert a force on _____. How must those forces be related? _____ (32, RS II)
 - b. Whenever object "A" exerts an impulse on object "B", we know that B must simultaneously exert an impulse on _____. How must those impulses be related? _____ (55)
9. Momentum Conservation Law: _____ before an interaction = _____ after. (37, 38, 55)
10. Rocket equation: If a rocket's exhaust velocity is represented by _____ and its mass ejection rate is _____, then its thrust = _____ (54b)
11. How is drag force related to velocity? (56)
12. Impulse is equivalent to the _____ on a graph of force vs time. (54, 54b)
13. How can the total force on an object be determined from its graph of momentum vs time if the object is moving along a straight path? (54, 54b)