

Chapter Twelve Science: Motion, Work, and Machines Study Guide

Lesson One

Position-location compared with things around it.

Motion-change in an object's position compared with fixed objects around it.
-can be described by giving an object's position at different times.

Distance-difference between the starting and ending points

Speed-how fast an object's position changes with time at any given moment.
-speed can change from moment to moment

Average Speed-divide total distance traveled by the amount of time it took
Average speed=distance / time

Velocity-the description of both speed and direction
-two objects can have the same speed but different velocities
-if either speed or direction change, velocity changes

Acceleration-the change of an object's velocity with time

Deceleration-the decrease in speed with time

Lesson Two

Force-push or a pull that one object exerts on another (examples-a magnet pulling a nail, a person pulling a luggage cart, a tugboat pushing a barge upriver)
-Force can change motion
-Force can change shape of objects

Force is measured by the use of a spring scale. A spring scale is marked off in measurements called newtons.
-need to state both the amount and a direction

Friction-a force that opposes the motion of one object sliding over another

Types of friction

- friction
- 1) Sliding friction-force applies by the worker and the friction act in opposite directions. Strength of the force applied by the worker is greater than the strength of the causing the box to accelerate.
 - 2) Static friction-prevents the start of any movement between surfaces in contact.
 - 3) Rolling friction-wheels and rollers are used to reduce friction.

Drag Force-as an object moves through air, the air molecules bump into it causing the object to slow down.
-depends on speed (faster the speed the faster the drag force)
-affects things that move through a gas or liquid

Gravity-objects being attracted to another object
-depends on both the masses of the two objects and the distance between the objects
-closer the objects are the stronger the force of gravity they exert on each other
-more mass the objects have the greater the pull they will have on each other

Weight-the force of gravity between Earth and the object (weight changes; mass does not)
Net Force-the combined effect of all the forces acting on an object.

Balanced Forces-anytime two or more forces acting on an object completely offset one another

Unbalanced Forces-when the force or forces acting on an object do not completely offset one another.

Newton's First Law-objects tend to remain unchanged

-an object at rest tends to stay at rest

-an object moving in a straight line at constant speed tends to keep moving that way

Inertia-the tendency of an object to oppose any change in its motion.

Lesson Three

Newton's Second Law of Motion-acceleration of an object is related to the object's mass and to the amount of force applied to the object.

$$a=F/m$$

-an object's acceleration equals the net force of an object divided by the objects mass.

-results of Newton's Second Law

1) for a given net force, objects with a greater mass have less acceleration

2) for objects of a given mass, a greater force results in a greater acceleration

Newton's Third Law of Motion-If object A exerts a force on object B, then object B exerts a force on object A that is equal in strength and opposite in direction.

Momentum-the quantity that measures both the mass of an object and how fast the object is moving.

$$\text{Momentum}=\text{mass} \times \text{velocity}$$

Conservation of momentum-the total momentum does not change if there are no outside forces acting on the system.