Absolute Zero

lowest possible temperature

all motion stops

Kelvin (K) temperature scale starts at absolute zero (0K)

0K = negative 273^0C

Acceleration

rate of change in an object's velocity

has both an amount and a direction (vector)

equal to the change in velocity divided by the time it takes to make that change

Center of Mass

(center of gravity)

average position of mass in an object

balance point

no rotation if force is applied here

Collision

when any two objects bump into each other

Displacement

an object's overall change in position

has both distance and direction (vector)

Energy

the ability to do work

standard unit of measure is the Joule

Force

a push or pull on an object

measured in Newtons (force needed to change the velocity of one kilogram by one meter per second every second)

Friction

resistance of motion when one object moves against another

a force measured in newtons

Gravity

force between the masses of any two bodies

- On Earth's surface the acceleration due to gravity is 9.8 m/s^2
- all objects with mass exert a gravitational force

Inertia

resistance to change in motion

- when we measure mass we are measuring the inertia of an object
- more inertia means more difficult to move or change motion

Joule

standard unit of measure for energy and work

- equals the force of one Newton over one meter of distance
- named after James Joule, who studied heat and work connections

Kinetic Energy

energy an object has due to its motion

calculated using the formula

$KE = \frac{1}{2}mv^2$ (m = mass, v = velocity)

Mass

measurement of how much matter is in an object

usually measured in grams or kilograms

Momentum

a measurement of mass in motion

equal to the mass times the velocity of an object

has both an amount and a direction (vector)

Newton

standard unit of measure for force

force needed to change the velocity of one kilogram by one meter per second every second

Newton's first law of motion

an object in motion will continue to move in the same direction and speed unless unbalanced forces act on it

an object not moving will continue to not move

called the Law of Inertia

Newton's second law of motion

acceleration of an object is directly proportional to the force on it (more force, more acceleration)

acceleration of an object is inversely proportional to its mass (more mass, less acceleration)

often expressed as Force = mass times acceleration (F = ma)

Newton’s third law of motion

for every action there is an equal and opposite reaction

states that forces always come in pairs

Potential Energy

energy stored by an object due to its state or position

rollercoaster at top of first hill has gravitational potential energy

energy in gasoline is stored chemical energy (stored sunlight)

Power

the rate at which energy is used

- calculated by dividing work done by the time it takes to do the work
- standard unit for power is the Watt

Pressure

force over a given area

Speed

how fast on object moves relative to a reference point

measured by distance over time not a vector quantity (only total distance divided by total time)

Vector

a quantity that has both a magnitude and a direction

velocity, acceleration and force are all vector quantities

Velocity

rate of change in an object's position

- a vector quantity with both amount and direction
- amount (magnitude) of velocity is the object’s speed

Watt

standard unit of measure for power

named after James Watt, known for his work on steam engines

Weight

force of gravity on an object

in physics, weight is measured in Newtons

Work

occurs in physics when a force acts on an object to move it

equal to the force times the distance is measured in joules

in physics, if an object does not move no work is done on it