

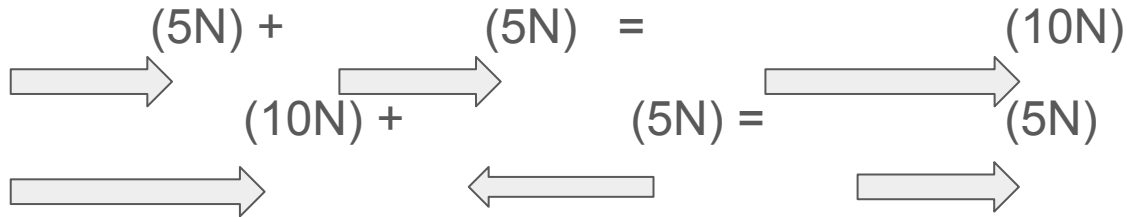
Physics

Motion and Energy

The Nature of Forces

What is a force - Gives energy to an object causing it to move, stop or change directions.

1. A force is a push or a pull
2. Balanced forces (cause no change in movement) vs. Unbalanced forces (causes change in movement)
3. Combining Forces:





APPLIED FORCE



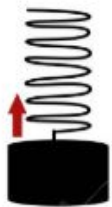
FRICTIONAL FORCE



GRAVITATIONAL FORCE



DRAG FORCE



SPRING FORCE



MAGNETIC FORCE



ELECTRIC FORCE



TENSION FORCE

Which team will win?

- 400

+ 300



- 100 - 120 - 180

+ 110 + 90 + 100

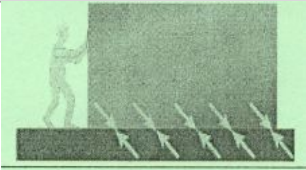
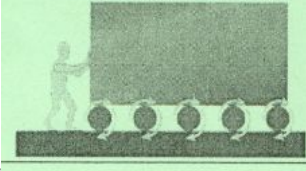
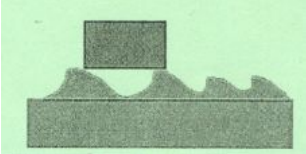


Friction

1. Friction is a force that opposes motion
2. Friction will cause an object to slow down and eventually stop

Example: Ball rolling down a hill

3 Types of Friction

Sliding	Opposes the motion of the object on surface		Push chair against floor
Rolling	Between wheels and surface		Ball Bearings Skate board Roller blades
Fluid	Opposes motion of object in a fluid		Swimming pool

Forces

- Push or a pull in a particular direction
- When something is dropped it is pulled to the ground by gravity
- Forces affect motion (start moving, move faster, move slower, stop moving, change direction, change shape)
- Forces are measured in newtons
- Forces usually act in pairs
- Forces usually can not be seen but their effects can
- Forces can cause acceleration



Forces in the Same Direction



25 N →

Net force
 $25\text{ N} + 20\text{ N} = 45\text{ N}$
to the right

20 N →

Forces in Different Directions



← 10 N

Net force
 $12\text{ N} - 10\text{ N} = 2\text{ N}$
to the right

12 N →

What is Physics?

The study of forces and motion

Motion- occurs when an object changes position over a period of time compared to a reference point.

A. Frame of Reference - use a certain point to observe how far an object moves

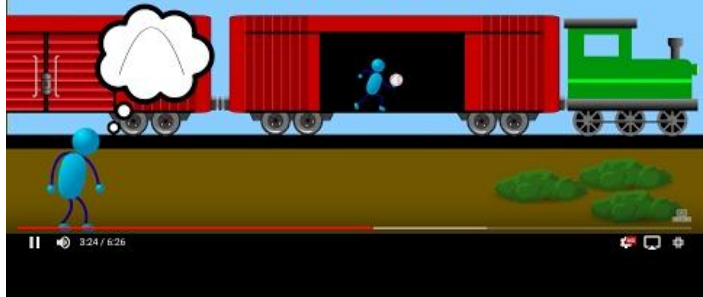
- *Most common frame of reference is Earth and Earth features

- *Can be stationary or Moving



09 Relative Motion

to the observer the ball has the same
horizontal velocity as the train



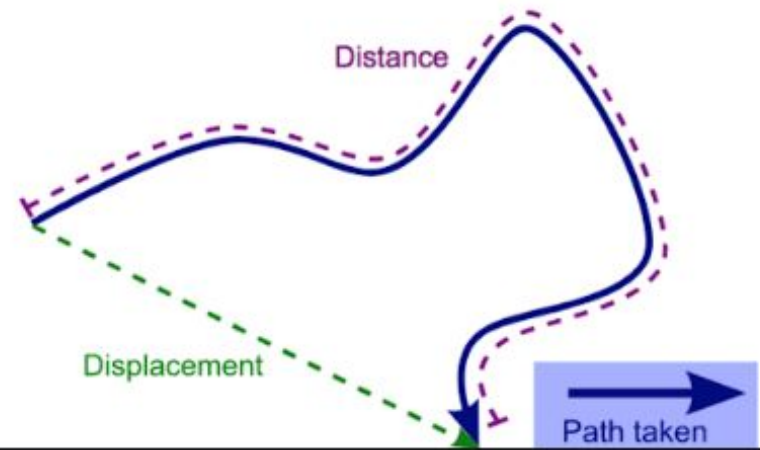
When the elevator accelerates upward, the spring scale reads a value greater than the weight of the fish.



When the elevator accelerates downward, the spring scale reads a value less than the weight of the fish.



Measuring Motion



Change in position over time

Distance - how far something travels. Direction does not matter.

Displacement - how far something is from where it started (Direction Matters)

Example: Three cities lie in a straight line. City A is 12km from City B. City B is 6km from City C. Suppose a delivery drive begins in city A and Travels to city C. Then she travels t city B.

Distance - it would be 18km from A to C and then 6 back to B for a total of 24 km

Displacement - The driver began at A, ended at B so the total displacement is 12km

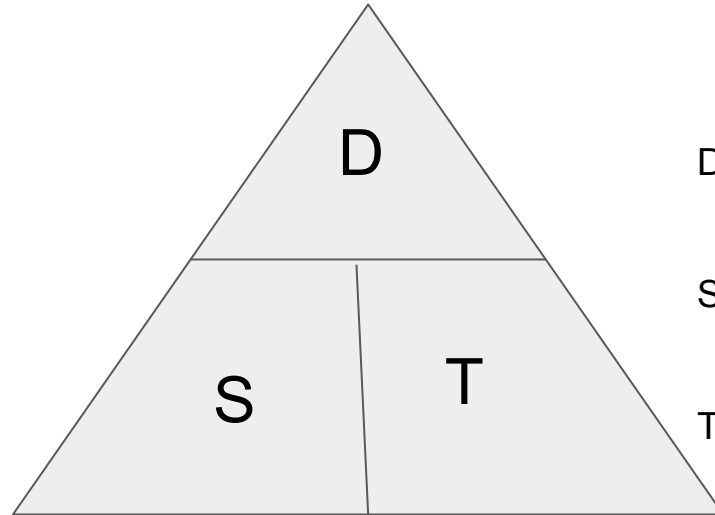
Speed

The distance traveled by a moving object per unit time.

The formula for average speed is total distance divided by total time.

Two types of speed

1. Average speed
2. Constant speed



Formulas

$$\text{Distance} = S \times T$$

$$\text{Speed} = D / T$$

$$\text{Time} = D / S$$



Velocity

Speed of an object in a particular direction

- Velocity changes as direction changes
- Combining velocities
- Speed is not equal to velocity
 - A. Add velocity if objects are moving in the same direction
 - B. Subtract velocities if objects are moving in different directions