

Kinematics Review

- What is a vector?**
- What is the difference between distance and displacement?**
- How do you read position time graphs?**
- What is velocity? How does it compare to speed?**
- How do you solve average velocity problems?**
- What is acceleration?**
- How do you solve acceleration problems?**

Vectors-

Size AND Direction

Example: 100m Right

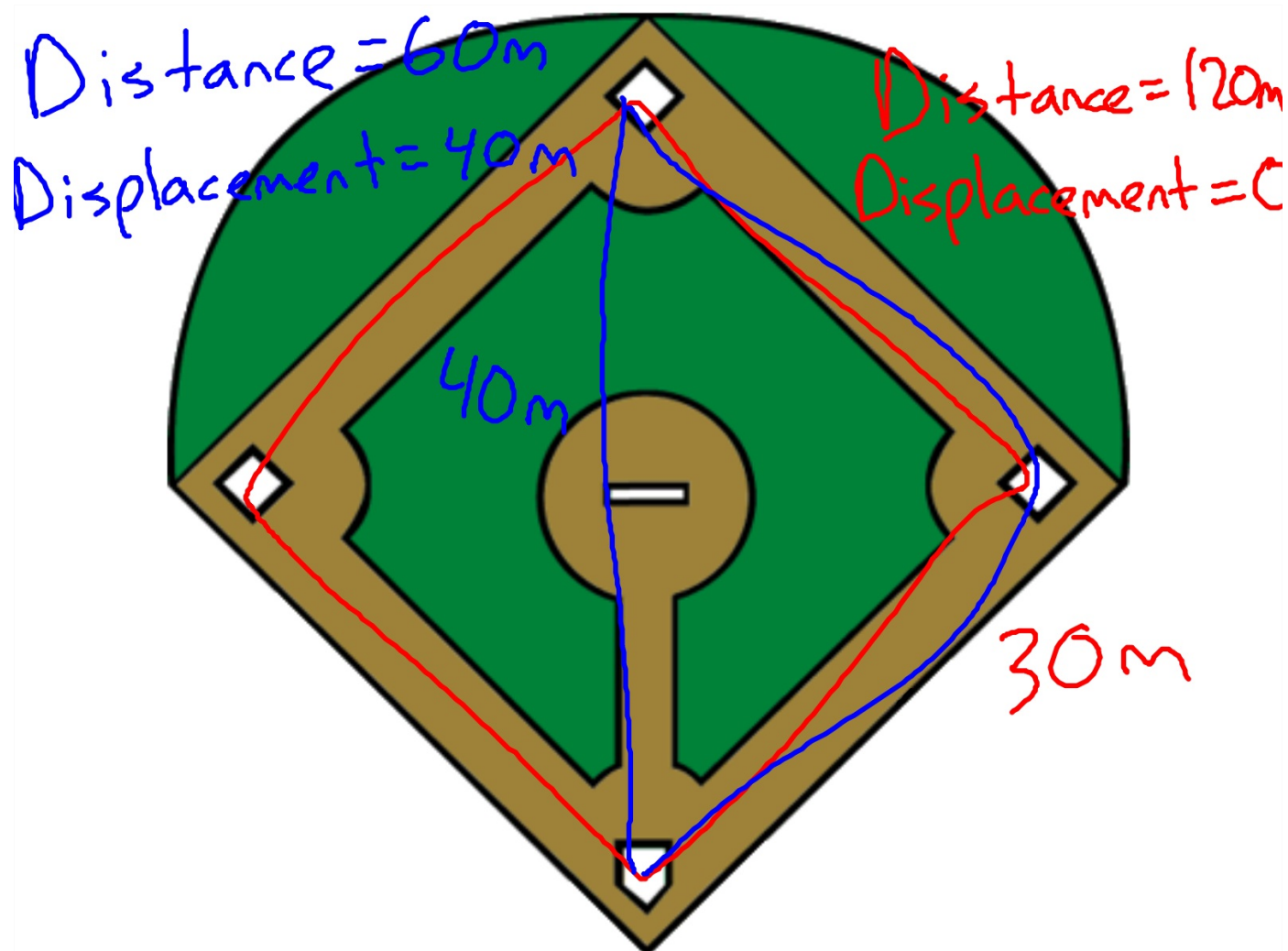
Scalars-

Size

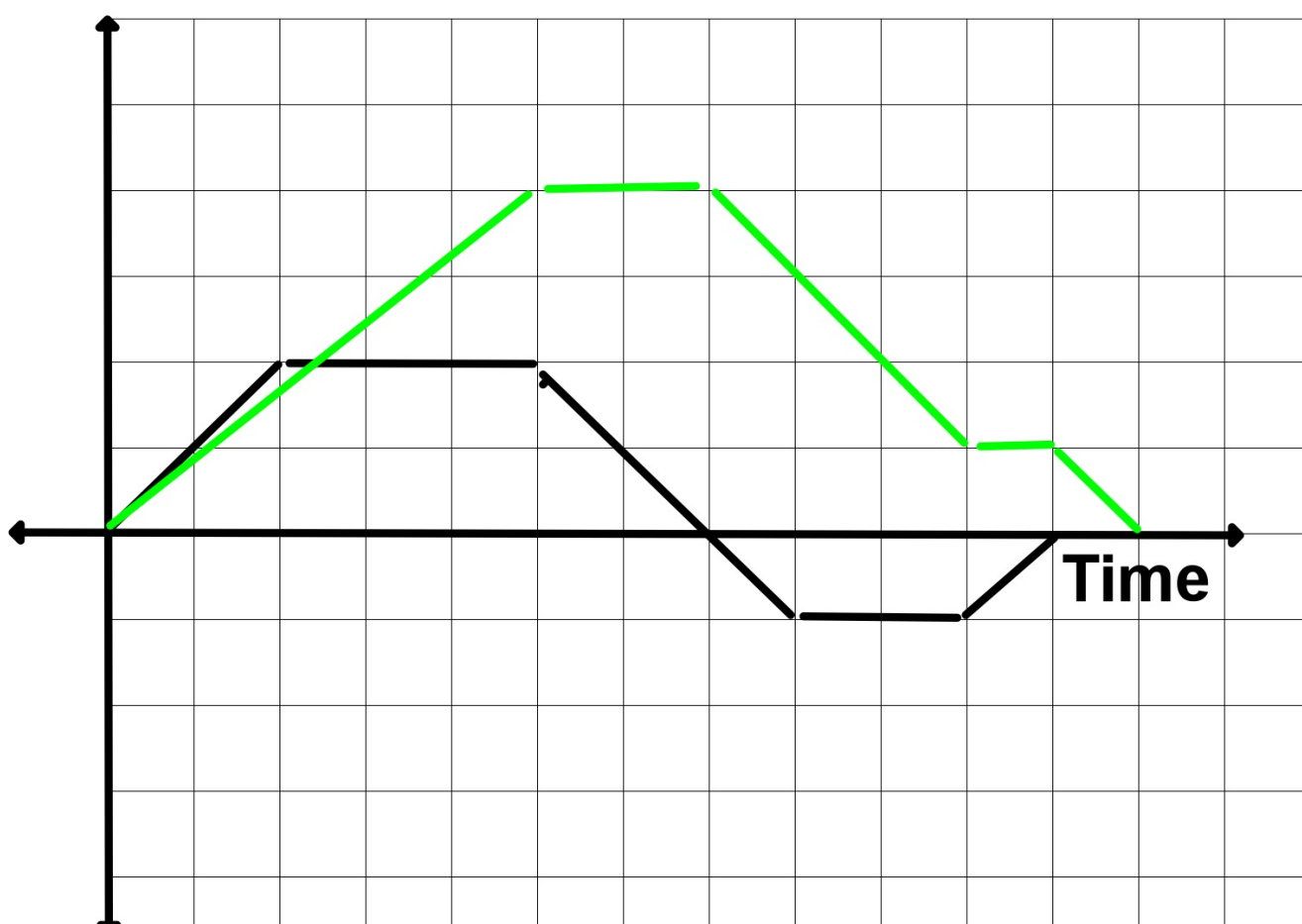
Example: 100m

Distance- How far

**Displacement- Comparing starting point to
finish**



Position



Time

Speed- How fast you are going
ex. 25mph

Velocity- How fast AND what
ex. 25mph West direction

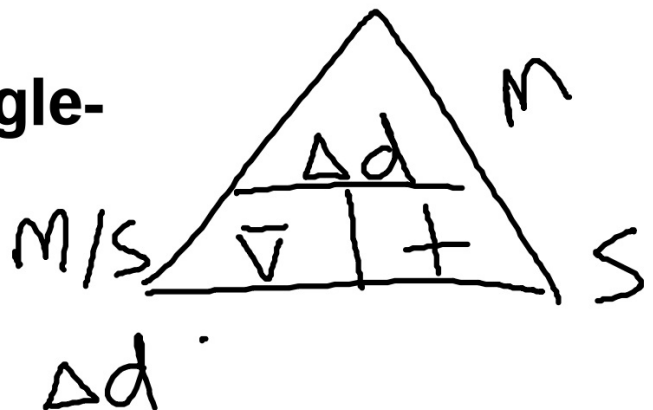
Average Velocity- $\frac{\text{change in displacement}}{\text{change in time}}$

$$\bar{V} = \frac{\Delta d}{\Delta t}$$

Magic Triangle-

Units-

$$\frac{M}{S}$$



Example- A car drives 40 m West in 20 seconds, what is its average velocity?

$$t = 20 \text{ sec} \quad d = 40 \text{ m West}$$

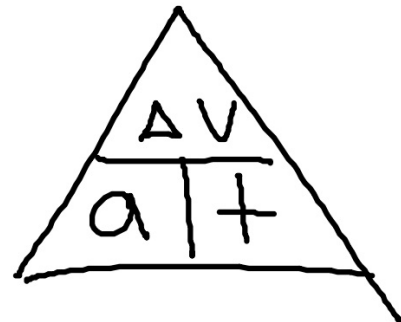
$$(2 \text{ m/s West})$$

Acceleration- Change in velocity each second

Units- $\frac{m}{s}$ $\frac{m}{s^2}$

Equation- $a = \frac{\Delta V}{t}$

Magic Triangle-



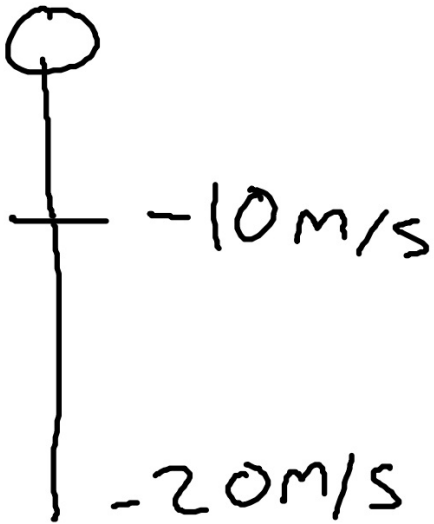
Examples- What is the acceleration of a car that goes from 0 m/s to +20 m/s in 5 sec?

$$\Delta V = +20 \text{ m/s}$$
$$t = 5 \text{ sec}$$

$$\boxed{+4 \text{ m/s}^2}$$



Acceleration of Gravity



$$-10 \frac{\text{m}}{\text{s}}$$

$$-10 \frac{\text{m}}{\text{s}^2}$$

Newton's Laws Reviews

What is Newton's first law?

What are some examples of this law?

What is Newton's second law?

How do you solve free body diagrams?

What is Newton's third law?

Newton's first law- object at rest stays at rest and an object in motion stays in motion, UNLESS acted upon by a force.

Examples- tablecloth trick
-hover disc (soccer)
-hovercraft

Inertia- how much an object wants to keep doing what it is doing.

Newton's 2nd Law- Any net (total) force will cause an object to accelerate

$$F_{net} = ma$$

Force- Any push or pull



Weight - Force caused by gravity.
Mass - amount of stuff never changes

$$W = mg$$

Normal- support force when two objects are in contact

Friction- caused when two surfaces rub against each other.

$$F_{net} = 100N - 30N = 70N \uparrow$$

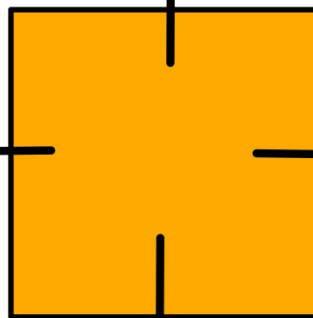
100 N

Mass is 3kg
Find F_{net}
Find acceleration

40 N

40 N

$$F_{net} = 40 - 40 = 0$$



30 N

70	
3	9

F	
m	a

23.3 m/s²

What is the acceleration of a 40 kg ball rolling on the ground that is pushed to the right by a 50 N force?

What is the weight of a 4 kg ball?

$$W = mg$$
$$4\text{kg}(-10\text{m/s}^2) = -40\text{N}$$
$$40\text{N}\downarrow$$

Newton's 3rd Law- when an object exerts a force on another that object exerts the same force back

-Forces always come in pairs

Centripetal Force- any force that creates circular motion

Must always- act towards the center of the circle

Momentum Review

What is momentum?

How does an impulse affect momentum?

What is conservation of momentum?

What are the two types of collisions?

Momentum- how much an object wants to stay in motion

Units- $\frac{\text{kg} \cdot \text{m}}{\text{s}}$

Equation- $p = m \times v$
mass X velocity



Magic Triangle

Impulse- when a force acts over a period of time. Impulse creates a change in momentum

Impulse = Force x Time

What is the momentum of a 4 kg dog moving at 5 m/s right?

What is the impulse caused by a 40 N force being applied for 2 seconds?

What is the change in velocity of a 5 kg object caused by a 100 kgm/s impulse?

Conservation of Momentum- In a collision the total momentum always remains the same

Collisions- when two objects hit each other

Elastic Collisions- when two objects hit and bounce off each other

Inelastic Collisions- when two objects hit and stick together moving as one

Energy Review

