Physics M1 Summary *Don't forget to practice the P.S very well(there's not much here)

Mathematics and Physics

Base(SI) Units :- *complete the blanks

Quantity	**Name of Unit.**	**Abbreviation**
Length	meter	
Mass	kilogram	kg
Temperature	kelvin	
Time		s
Substance		mol
Current	ampere	A
Intensity	candela	

- For this lesson you should know how to shift and solve for variables/unit
- + you need to know unit conversions(/prefixes)

Uncertainties in Measurement

Measurement :- measuring unknown quantity

- determining amount of unknown quantity by using standard known quantity.

- **Parallax error** : shift in position, or viewing from various angles.
  - viewing from the wrong angle

Measurement Uncertainty :- true value between the range

- is the range of possible values within which the true value of which the measurement lies.

- The lesser the uncertainty bar, the more precise, and vice versa.
- The closer the measurement to the average(value), it'll be more accurate.

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Graphing Data(Linear Relationships) ==> slope that is straight/constant line

Types of Variables :-

1. **Dependent variable** :- result and the measuring of the IV

- It is being measured or tested in an experiment.
- It lies on the y-axis/vertical axis

2. **Independent variable** :- varies

- varied in an experimental study.
- It results in the change of the DV
- It lies on the x-axis/horizontal axis

Formula :-

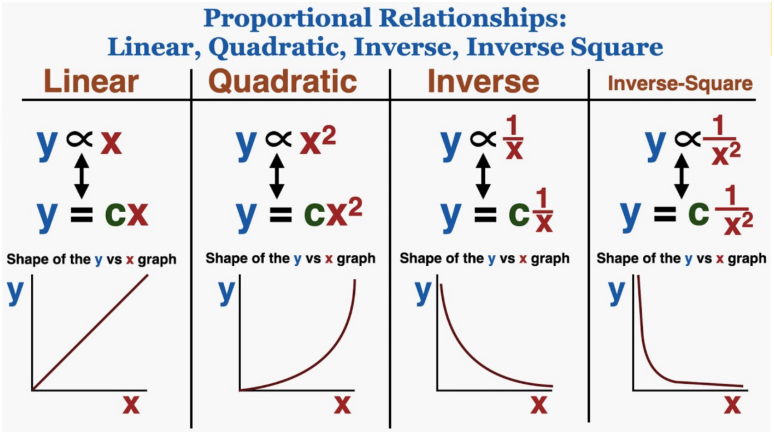
$$y = mx + b$$

$$\text{slope} = \frac{\text{rise}}{\text{run}} \rightarrow \frac{\Delta x}{\Delta y}$$

- Metric(SI) units will not make a difference in the line - graph.
  - numbers won't change/differ → (you have the same set of data)

Non-linear Relationships 📉

Formulas :-



- The constant(c) is what's going to be left and what shows the relationship of the graph

Challenge : *Do the working and show the graph's relationship

A. Given the equation, analyze the relationship between current (I) and resistance (R) . You need to identify/construct the following: $I = V/R$

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Position-Time Graph

Position-Time Graph : **Δx/t**

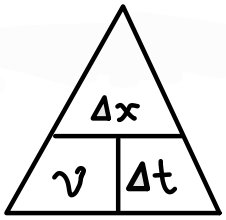
- Shows changes in position of object overtime

Features :-

- x → time ; y → displacement (Δx)
- slope = v → m/s or rise/run
- steeper = faster(higher slope)

- The area under the graph is the slope(v)
- *When the object is going down it experiences a negative slope and vice versa

Formula :-



How fast ?

Reaction Time :- Usually measured in: ms, or s

- the amount of time a human takes to respond, or act.

- **Average Velocity** :- represented by the *slope*, and has direction(-+)

Average Speed :- has no direction, and its always a positive(+) number

- The |absolute value of a slope|, which is the distance(m) traveled divided by the amount of time(s).
- |slope| <—scalar quantity

Instantaneous Velocity :- the velocity at this instant/time

- The speed and direction of an object at a particular instant.

Formula :-

$$X_F = \overline{v} \cdot t + X_i$$

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Acceleration(V-t graph)

Velocity-time graph : Δv

- shows changes in velocity of a moving object overtime

Features :-

1. A horizontal line on a velocity-time graph, shows that the object is at constant velocity/(0 acceleration)
2. A positive slope indicates positive acceleration and vice versa
3. Area under the curve determines the displacement

Formulas :

VT Acceleration formula → $\vec{a} = \frac{\Delta v}{t}$

How does the <u>area under the curve</u> determine the displacement : ***Area Formulas**

1. (Triangle) 🔺 : A = ½ bh (**m^2**) <— unit
2. (Square/rectangle) ⬛ : A = bh (**m^2**) <— unit

Acceleration(2 part motion)

- Mostly this lesson is solely based on P.S and not much explanation

Acceleration in two-part motion : typically refers to situations where <u>an object undergoes two distinct phases of motion</u>, often with different accelerations.

- This can be seen in problems where an object accelerates, then decelerates, or where it moves in two different directions with varying speeds.

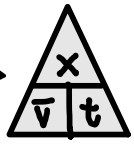
Formulas :

$$a = \frac{\Delta v}{t} \qquad v^2 = v_0^2 + 2ax$$

$$a = \frac{vf - vi}{t} \qquad x = v_0 t + ½at^2$$

Constant velocity triangle

$$\Delta x = \bar{v} t \rightarrow$$



Challenge : A car starts from rest and accelerates at a rate of 3 m/s2 for 4 seconds. After reaching its maximum speed, it immediately begins to decelerate at −2 m/s2 until it comes to a stop. Calculate the total distance traveled by the car during the entire motion.

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Vector and Vector Resolution

- For this lesson don't forget to memorize :=> SOH(sine) CAH(cosine) TOA(tangent)
- Don't forget your protractor for this lesson.

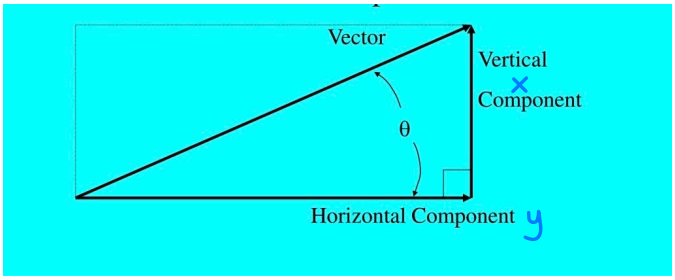
Vector/(Quantity) :

- a quantity that has both magnitude(num/1 unit) and direction("like compass").

Vector Components : [x] factors or the "Given" in a question

- x, y, and hypotenuse

Anatomy of a Vector :



- The length of the arrow is directly proportional to the magnitude.
- A shorter arrow would indicate that there's small amount of magnitude and vice versa.

Using Vectors : *a tip

S(outh) of ***N***(orth)

- The above example indicates that the vector direction is from(starts) from North and goes to South .
- "[to] of [from]"

Vector Resolution(In P.S) -> V_R	**Vector Components**(Helps in finding V_R)
magnitude(V_R) -> c = $\sqrt{a_2 + b_2}$ direction(= angle) -> The inverse of tan. • It's the hypotenuse • You only use (tan) here	• You only use : SOH, CAH • Direction matters components : x, y

Challenge : A -5N S 30* below horizontal, find the vector components.