Math guide 5

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1 SUVAT

SUVAT refers to an acronym which involves all the variables required to solve a kinematic equation, where acceleration is constant. It stands for

-S displacement

-U initial velocity

-V final velocity

-A cceleration (Finally, one that aligns with its acronym)

-T ime (Another one alas!)

There are also 5 equations that accompany these variables, to connect them all

$$v^2 = u^2 + 2as \tag{1}$$

$$v = u + at \tag{2}$$

$$s = ut + \frac{1}{2}at^2 \tag{3}$$

$$s = \left(\frac{u+v}{2}\right)t \tag{4}$$

$$s = vt - \frac{1}{2}at^2 \tag{5}$$

We derive 2 from the definition of acceleration ($\frac{v-u}{t} = a$). 4 is from the definition of average speed ($\frac{\text{Total displacement}}{\text{time}} = \text{average speed}$). 3 is derived by substituting 2 into 4, similarly, rearranging and substituting t from 4 into 2 gets 1. Unfortunately 5 is used once every infinite years and if you recall from limits,

$$\lim_{x\to\infty} \frac{1}{x} = 0$$

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1.1 Graphs

To understand these graphs, it is vital to understand the difference between velocity and speed, and displacement and distance. The former of the 2 are vectors, so the direction is important and also that means it can be negative, whereas the latter are the scalar versions, so they can only be positive. The first graph is a velocity-time graph

1.2 Equations

2 Calculus