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Kinmatic equations of uniformly accelurated motion by Graphical method.

First equation of motion

acceleration = $\frac{\text{Change in velocity}}{\text{time taken for change}}$.

$a = \frac{BD}{AD}$

$a = \frac{AE}{OC}$

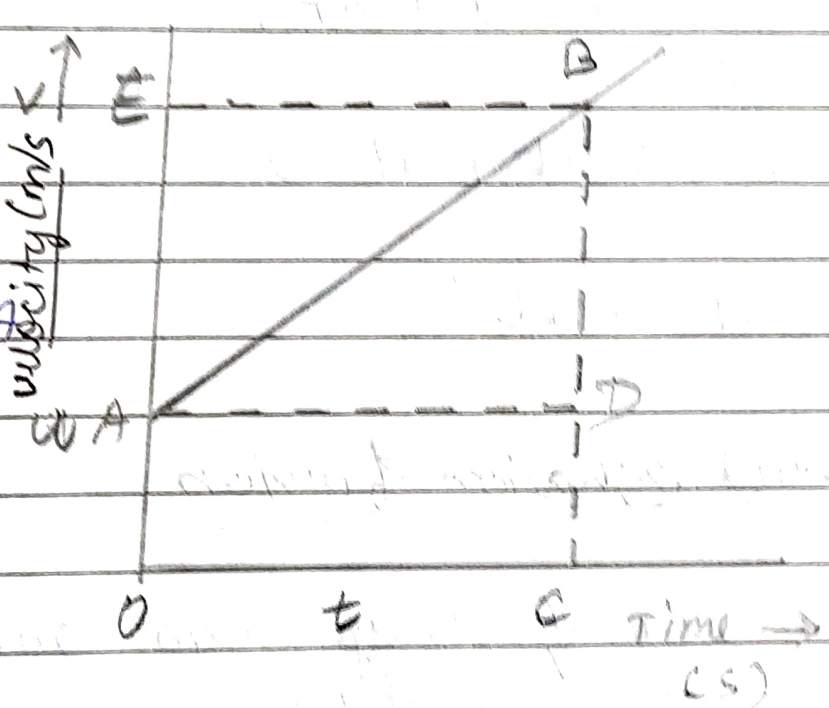
$a = \frac{OE - OA}{OC}$

$a = \frac{v - u}{t}$

$v - u = at$

or

$\boxed{v = u + at}$



Second equation of motion

The area of trapezium OABC gives the distance travelled

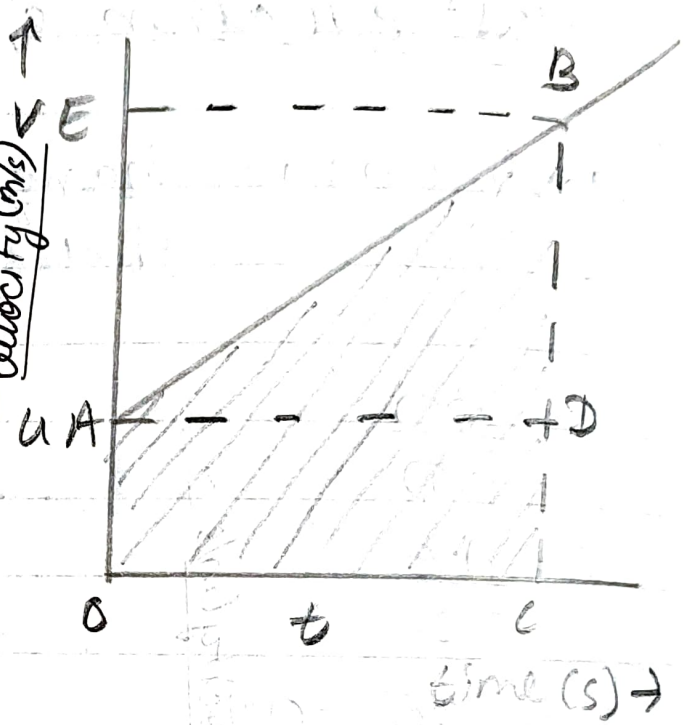
$$S = \frac{1}{2} \times OC \times (OA + CB)$$

$$S = \frac{1}{2} t(u + v)$$

$$S = \frac{1}{2} t(u + u + at)$$

$$S = \frac{1}{2}(2ut + at^2)$$

$$S = ut + \frac{1}{2}at^2$$



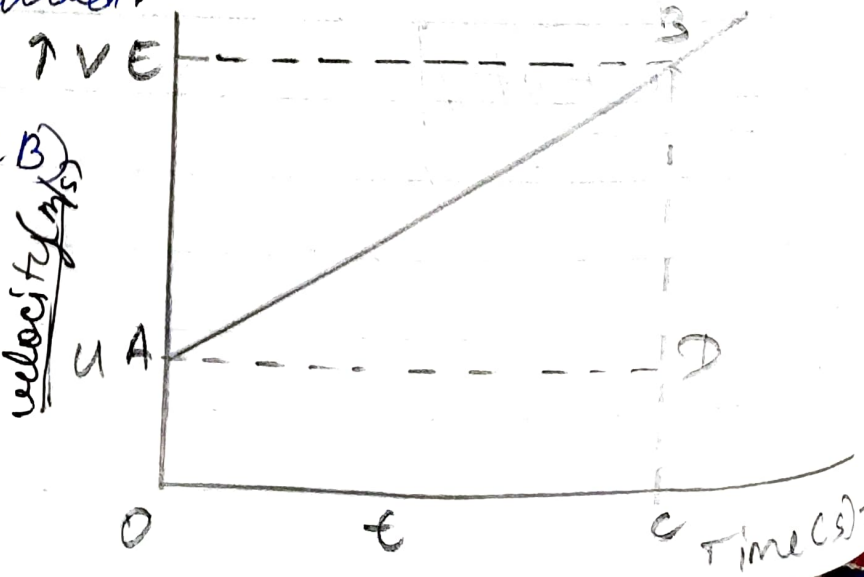
Third equation of motion

The area of trapezium OABC gives the distance travelled.

$$S = \frac{1}{2} \times OC \times (OA + CB)$$

$$S = \frac{1}{2} t(u + v)$$

$$v + u = \frac{2S}{t}$$



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from the first equation of motion we have,

$v - u = at$

multiplying equation (1) & (2) we get

$v^2 - u^2 = 2as$

$v^2 = u^2 + 2as$.