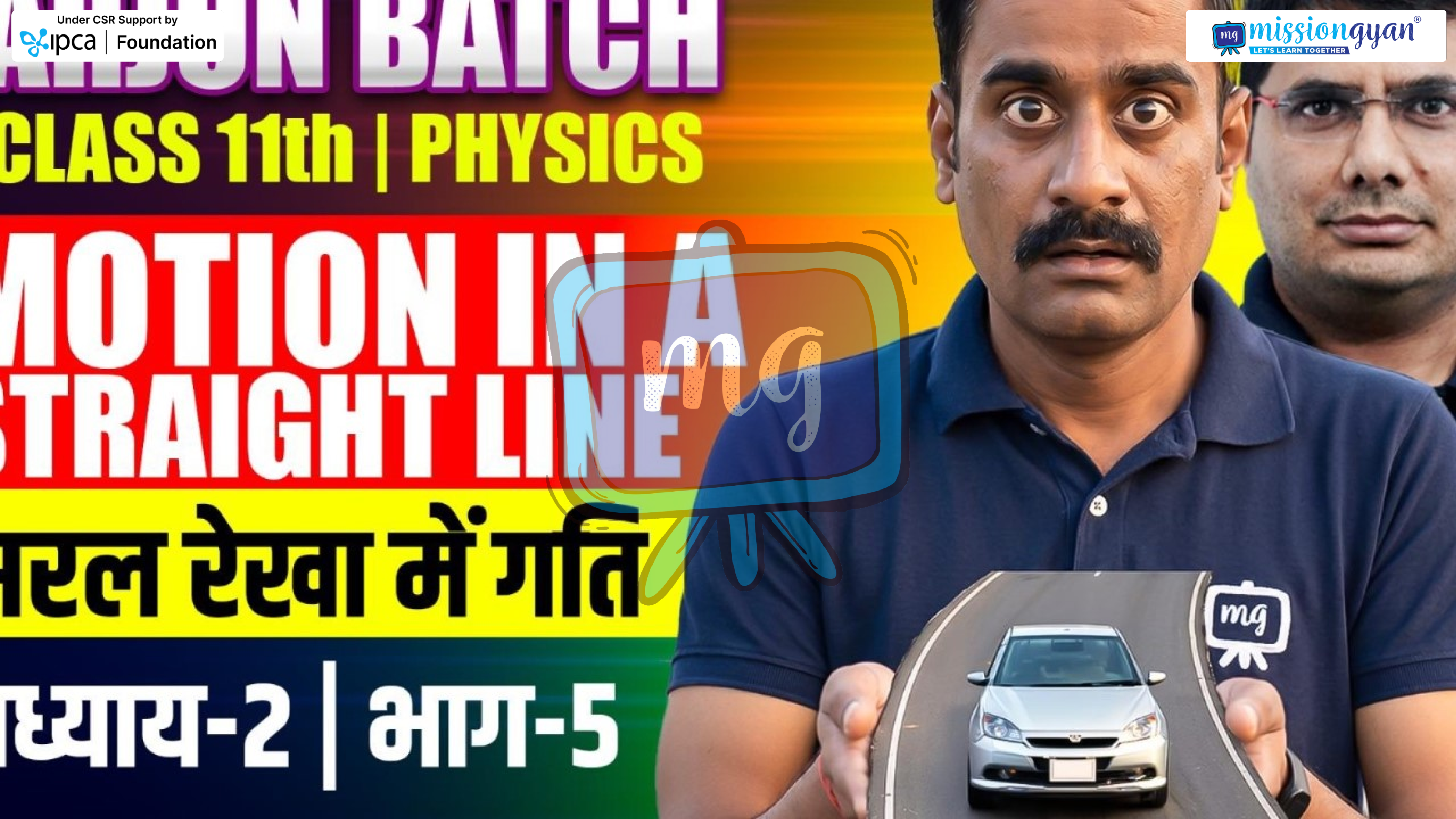
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LET'S LEARN TOGETHER
BATCH
CLASS 11th | PHYSICS
MOTION IN A
TRAIGHT LINE
रेखा में गति
भाग-5

आज क्या पढेंगे ?

1 समत्वरित गति के समीकरण

$$\frac{dv}{dt} = a$$

$$\frac{dx}{dt} = v$$

कलन विधि

$$\boxed{v = \frac{dx}{dt}} \Rightarrow dx = v\,dt$$

$$\int dx = \int v\,dt$$

differential

अवकलन

$\frac{d}{dx}$

$$\int_0^x dx = \int_0^t v\,dt$$

$$[x]_0^x = v\int_0^t dt$$

$$(x-0) = v[t]_0^t$$

$$\int c\,dx = cx$$

$$\int 1\,dx = 1\times x$$
$$= x$$

$$\int c\,dt = ct$$

$$\int 1\,dt = 1\times t = t$$

$$\int dx = \int_0^x$$

$$\int dt = \int_0^t$$

$$\int_u^v dv$$

$$\int_u^v dv = [v]_u^v = (v-u)$$

$$\int_0^x dx = [x]_0^x = (x-0) = x$$

$$\int_0^t dt = [t]_0^t = (t-0) = t$$

प्रथम समीकरण

त्वरण = $\dfrac{\text{वेग में परिवर्तन}}{\text{समय}}$

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

$v - u = at$

$a = \dfrac{dv}{dt} \Rightarrow dv = a\,dt$

$\int_u^v dv = \int_0^t a\,dt$

$[v]_u^v = a[t]_0^t$

$v - u = a(t - 0)$

$\boxed{v = u + at}$

द्वितीय समीकरण

$$v = \frac{dx}{dt}$$

$$dx = v\,dt$$

$\because (v = u+at)$ रखने पर

$$dx = (u+at)\,dt$$

$$\int_0^x dx = \int_0^t (u+at)\,dt$$

$$[x]_0^x = \int_0^t u\,dt + \int_0^t at\,dt$$

$$(x-0) = u\int_0^t dt + a\int_0^t t\cdot dt$$

$$x = u(t-0) + a\left(\frac{t^2}{2} - 0\right)$$

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

$$\frac{t^{1+1}}{1+1}$$

$$\int_0^t t\,dt = \left[\frac{t^2}{2}\right]_0^t = \left(\frac{t^2}{2} - 0\right)$$

$$\frac{x^{n+1}}{n+1}$$

$$\frac{x^{1+1}}{1+1}$$

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तृतीय समीकरण

$v = \frac{dx}{dt}$, $a = \frac{dv}{dt} \times \frac{dx}{dx}$

$a = \frac{dx}{dt} \frac{dv}{dx}$

$\frac{a}{1} = v \frac{dv}{dx}$

$v\, dv = a\, dx$

$\int_u^v v\, dv = \int_0^x a\, dx$

$\left[\frac{v^2}{2}\right]_u^v = a \int x\, dx$

$\frac{1}{2}(v^2 - u^2) = a(x - 0)$

$v^2 - u^2 = 2ax$

$\boxed{v^2 = u^2 + 2ax}$

III

$$\int_u^v v\,dv = \frac{v^{1+1}}{1+1} = \left[\frac{v^2}{2}\right]_u^v$$

$$= \left[\frac{v^2}{2} - \frac{u^2}{2}\right] = \frac{1}{2}\left(v^2 - u^2\right)$$

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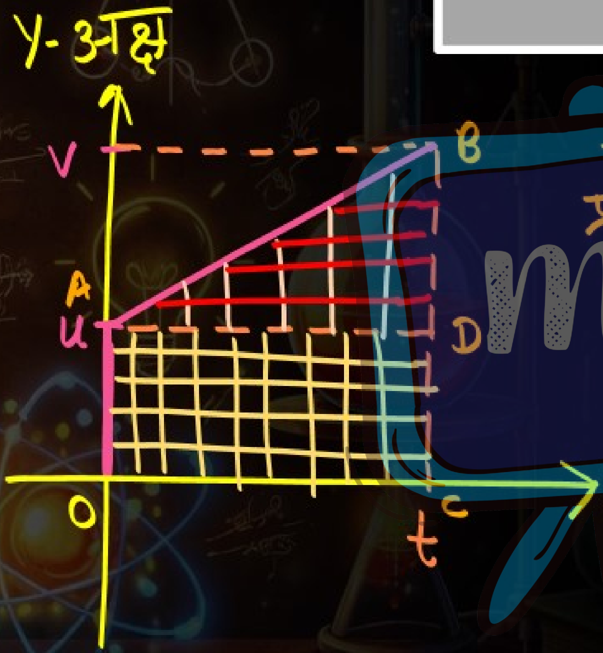
सामान्य विधि

कलन विधि

ग्राफीय विधि

ग्राफीय विधि



प्रवणता (ढाल)

$$\tan\theta = \frac{BD}{AD} = \frac{v-u}{t-0} = \boxed{\frac{v-u}{t} = \frac{a}{1}}$$

$$v - u = at$$

$$\boxed{v = u + at}$$

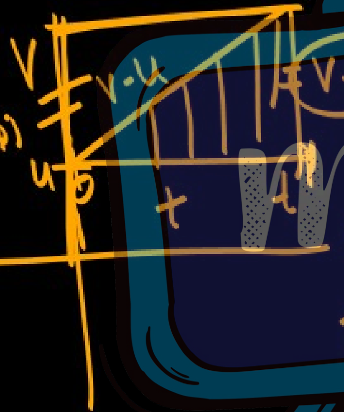
Rough

$\tan\theta = \dfrac{Y\text{-अक्ष}}{X\text{-अक्ष}}$ = ग्राफ का ढाल

v-u

t

$\tan\theta = \dfrac{V}{I} = R$



v-u का
समय

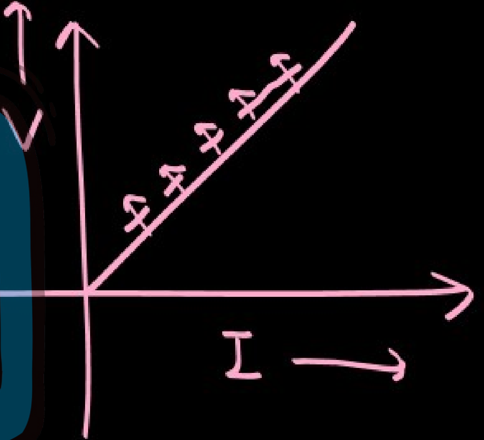
$\dfrac{v-u}{t} = a$

(प्रवणता)
ढाल (Slope) → ग्राफ में

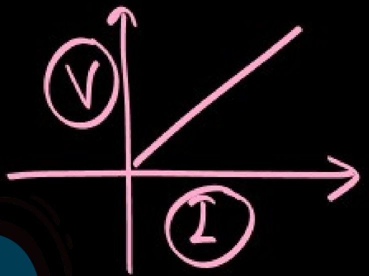
केवल समप्रमा है

ओम के नियम $\boxed{V \propto I}$

$\boxed{I \propto V}$



$$\text{ढाल} : \frac{Y\text{-अक्ष}}{X\text{-अक्ष}}$$

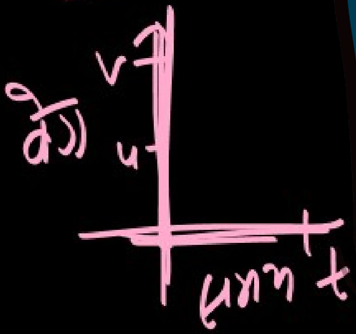


$$\frac{V}{I} = R$$

Zakas

★★★

वेग-समय ग्राफ का ढाल क्या दर्शाता है?



ढाल $= \dfrac{y\text{-अक्ष}}{x\text{-अक्ष}} = \tan\theta = \dfrac{\text{वेग}}{\text{समय}} = $ त्वरण

y-अक्ष × x-अक्ष

वेग × समय ग्राफ

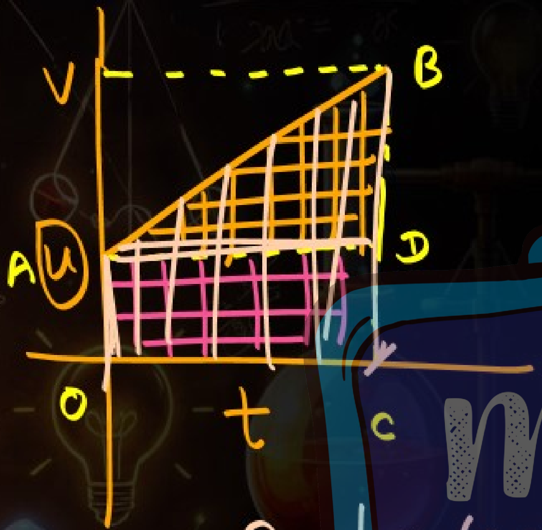
क्षेत्रफल = आयत का क्षेत्रफल + समकोण त्रिभुज का क्षेत्रफल

$A = (OA \times AD) + \frac{1}{2} \times (AD)(BD)$

$S = ut + \frac{1}{2} t \underbrace{(v-u)}_{at}$

$\left(a = \frac{v-u}{t} \Rightarrow v-u = at \right.$

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



સમલમ્બચતુર્ભુજ ના ક્ષેત્રફળ

$= \frac{1}{2} \times$ (સમાન્તર ભુજાઓ ના યોગ)

$\times$ દોનોં ભુજાઓ કે બીચ

કી દૂરી

$$S = \frac{1}{2} \times (OA + BC) \times AD$$

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

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

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

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

$$s = \frac{1}{2}(v+u)\frac{(v-u)}{a} \Rightarrow s = \frac{1}{2}\frac{(v^2-u^2)}{a}$$

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

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

क्षेत्रफल ⇒ विस्थापन

S

$$\text{वेग} = \frac{\text{विस्थापन}}{\text{समय}}$$

$$\boxed{\text{विस्थापन} = \text{वेग} \times \text{समय}}$$

समाकलन (२) उपयोग

(1) त्वरण का समाकलन करते हैं तब वेग प्राप्त होगा

$$v = \int a\, dt$$

त्वरण के वेग का समाकलन करते हैं तब

$$x = \int v\, dt$$

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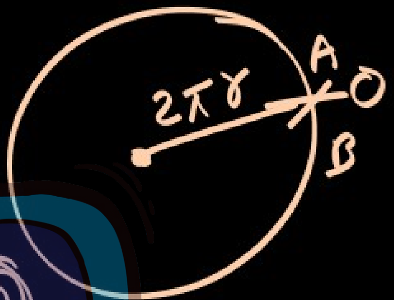
(2) क्षेत्रकलन



अल्पांश

$$\int_0^{2\pi r} dA = (A)_0^{2\pi r}$$

$$= (2\pi r - 0)$$

$$= 2\pi r$$

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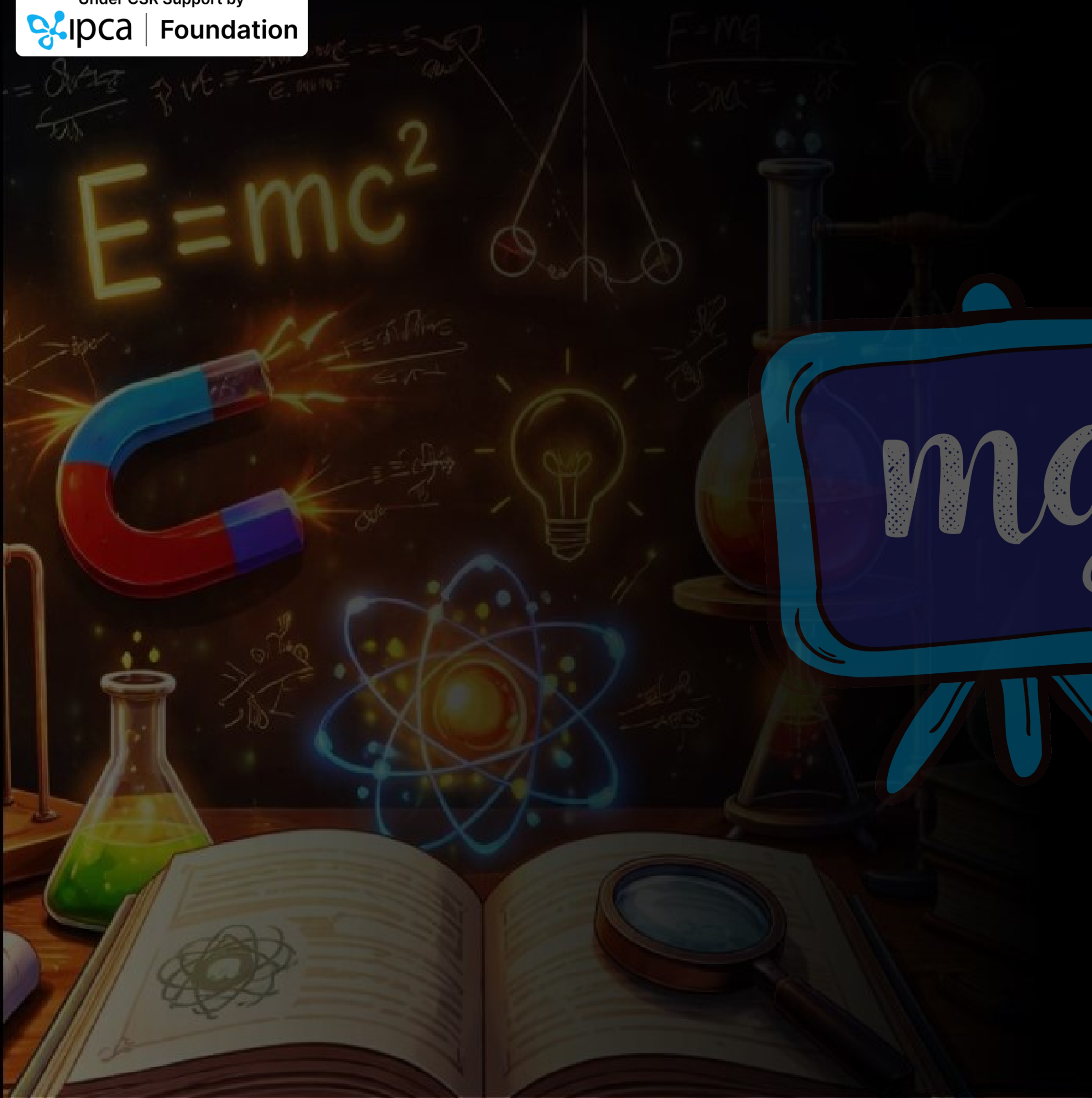

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