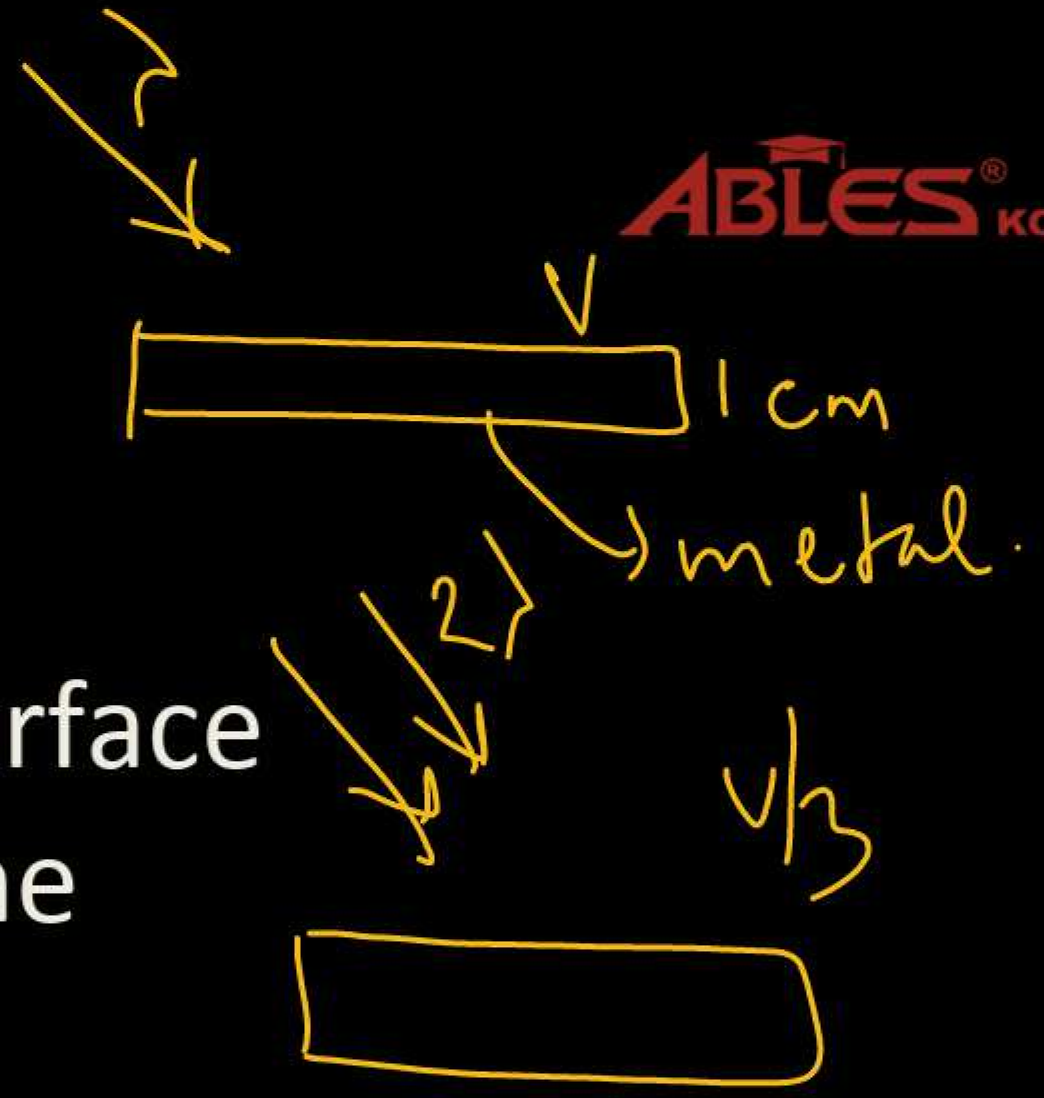
$\frac{3hc}{4\lambda} = \frac{4hc}{4\lambda} - \frac{hc}{\lambda_0}$

$\Rightarrow \frac{hc}{\lambda_0} = \frac{hc}{4\lambda}$

$K_{max} = h\nu - \phi$

$K_{max} = \frac{hc}{\lambda} - \frac{hc}{\lambda_0}$



Q 2). When a centimeter thick surface is illuminated with light of wavelength λ, the stopping potential is V. When the same surface is illuminated by light of wavelength 2 λ, the stopping potential is V/3. The threshold wavelength for the surface is:

$eV = \frac{hc}{\lambda} - \frac{hc}{\lambda_0}$ — (1)

$eV/3 = \frac{hc}{2\lambda} - \frac{hc}{\lambda_0}$ — (2)

(1) − (2)

$\frac{2eV}{3} = \frac{hc}{2\lambda} \Rightarrow eV = 3hc/4\lambda$

A). 4 λ/3	B). 4 λ
C). 6 λ	D). 8 λ/3

Q 3). The maximum KE of photoelectrons emitted from a surface when photons of energy 6 eV fall on it is 4 eV. The stopping potential is:

$K_{max} = h\nu - \phi$

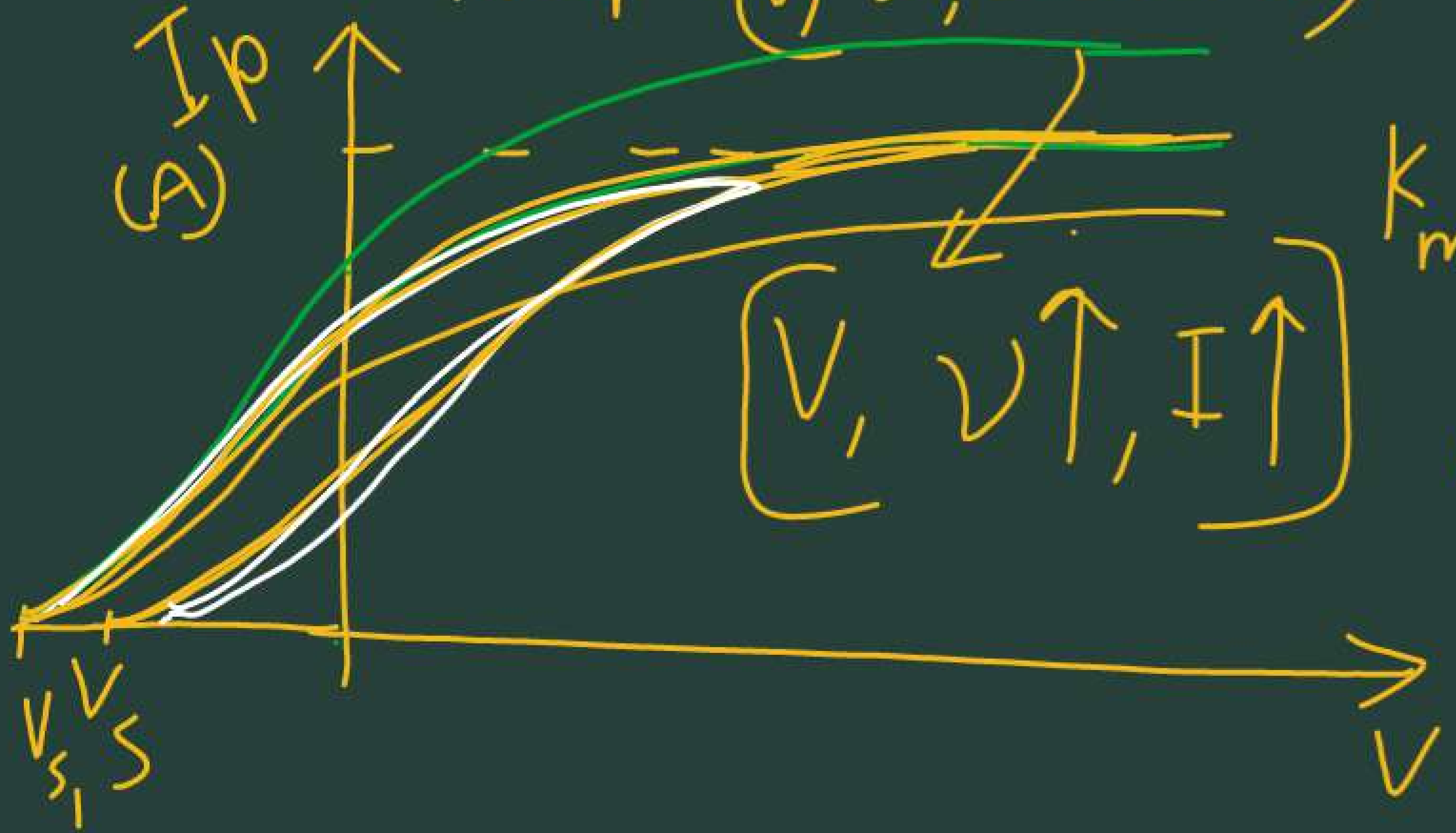
$4 = 6 - \phi$

$\Rightarrow \phi = 2 eV$

A). 2V B). 4V C). 6V D). 10V

② I_p v/s Voltage (freq. variation)

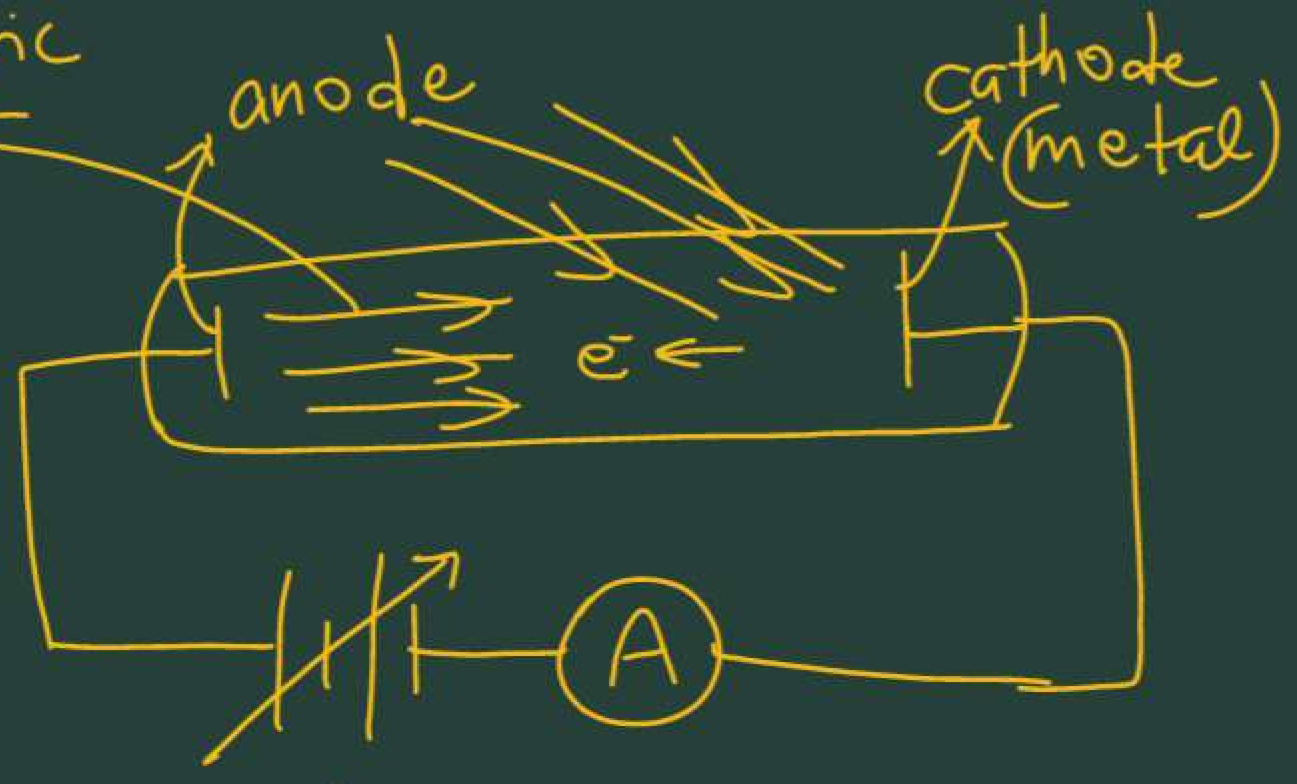
indep → (V, ν, I = const)



$$K_{max} = h\nu - \phi$$

$$eV_s = K_{max}$$

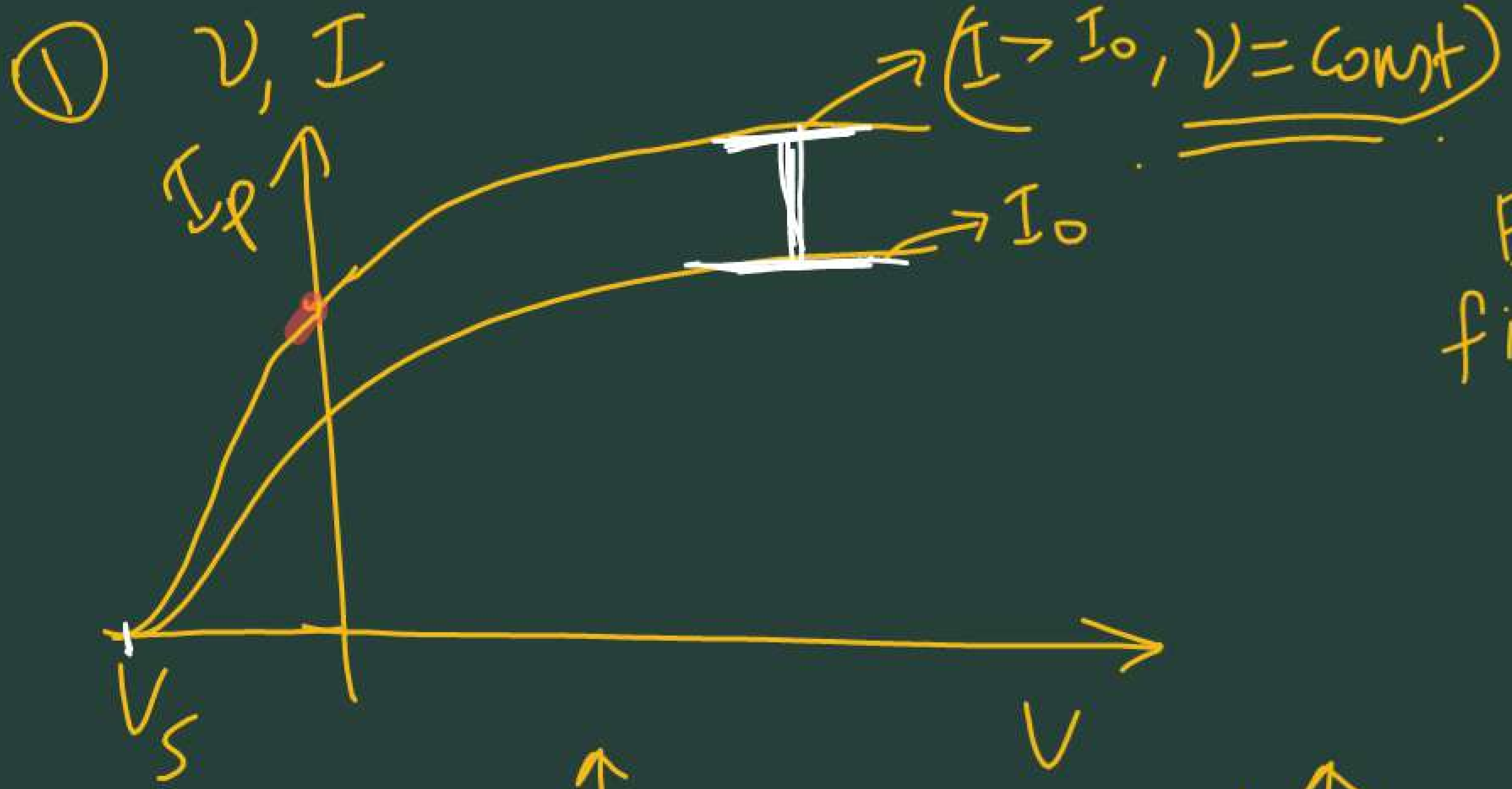
ν

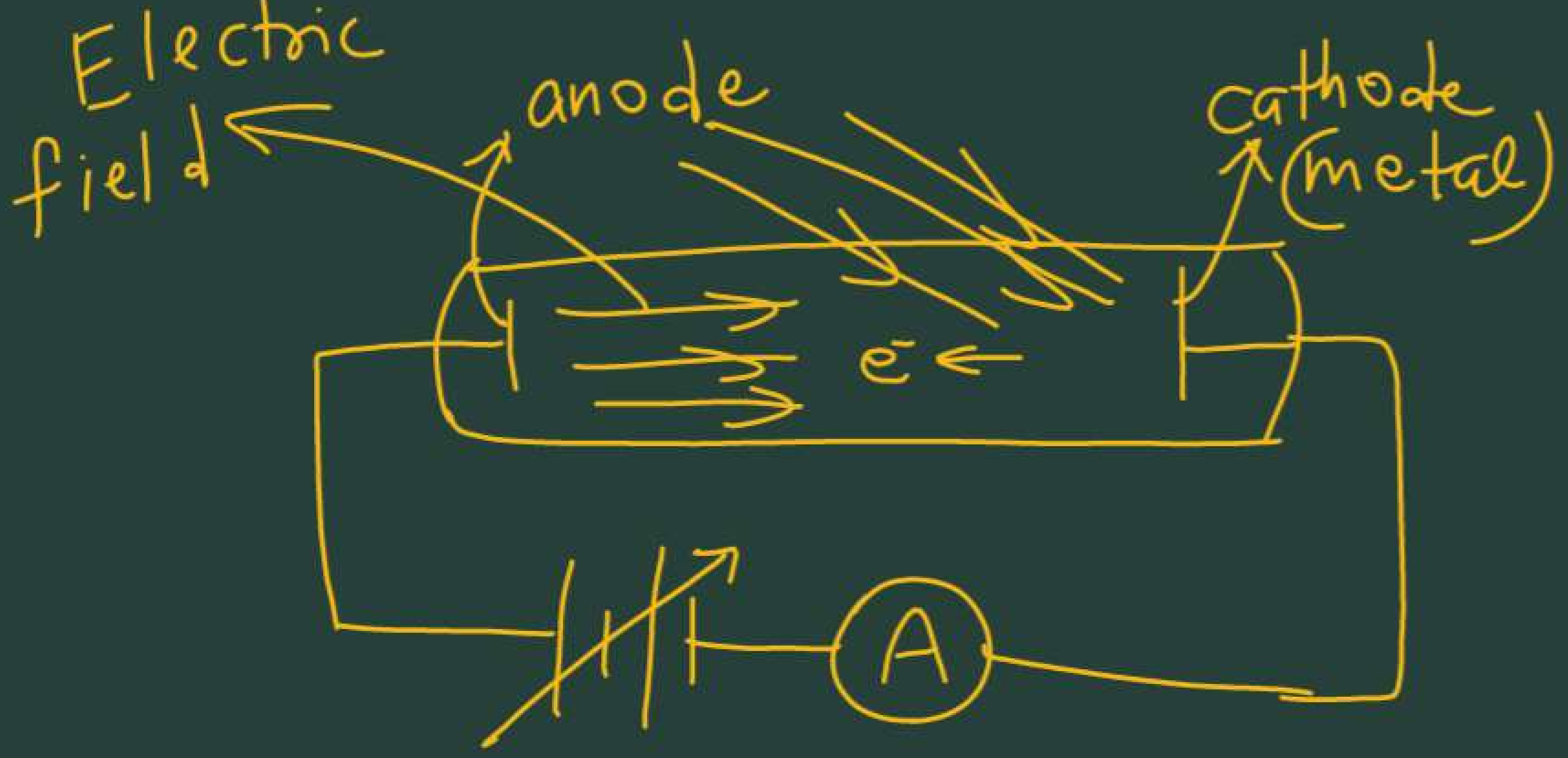


Photoelectric effect expt setup.

Dep. param → I_p, K.E., V_s

Indep. — " — → ν, I, V, ϕ, λ_0, ν_0





Intensity ↑ ⇒ No of photons/s ↑ (provided ν = const)

E = total energy / (Normal area)(sec)

⇒ ν ↑ (provided no of ph/s = const)

⇒ ν ↑ no of photons/s ↑

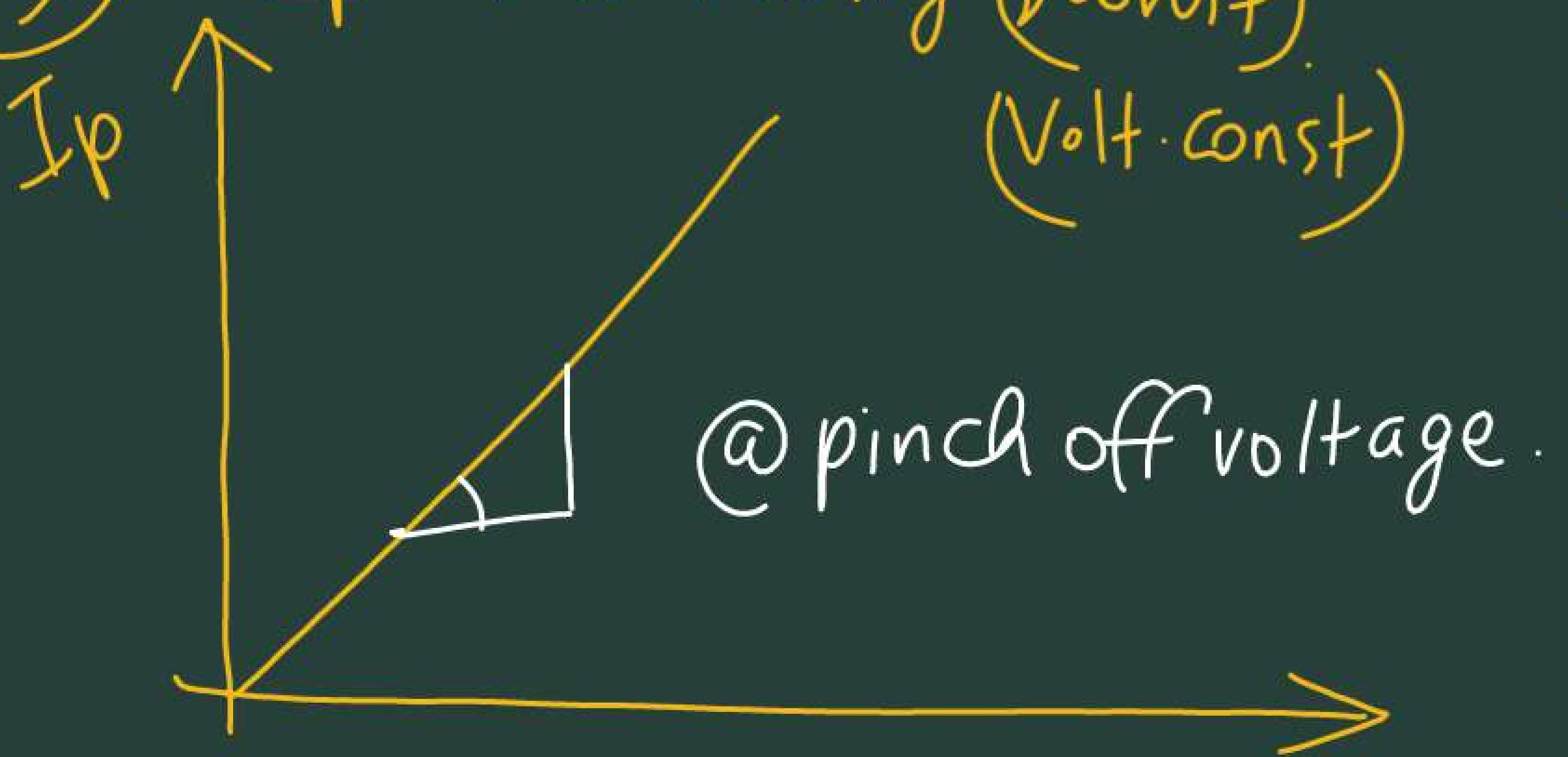
Photoelectric effect expt setup.

Dep. param → I_p, K.E., V_s

Indep. — " — → ν, I, V, φ, λ_0, ν_0

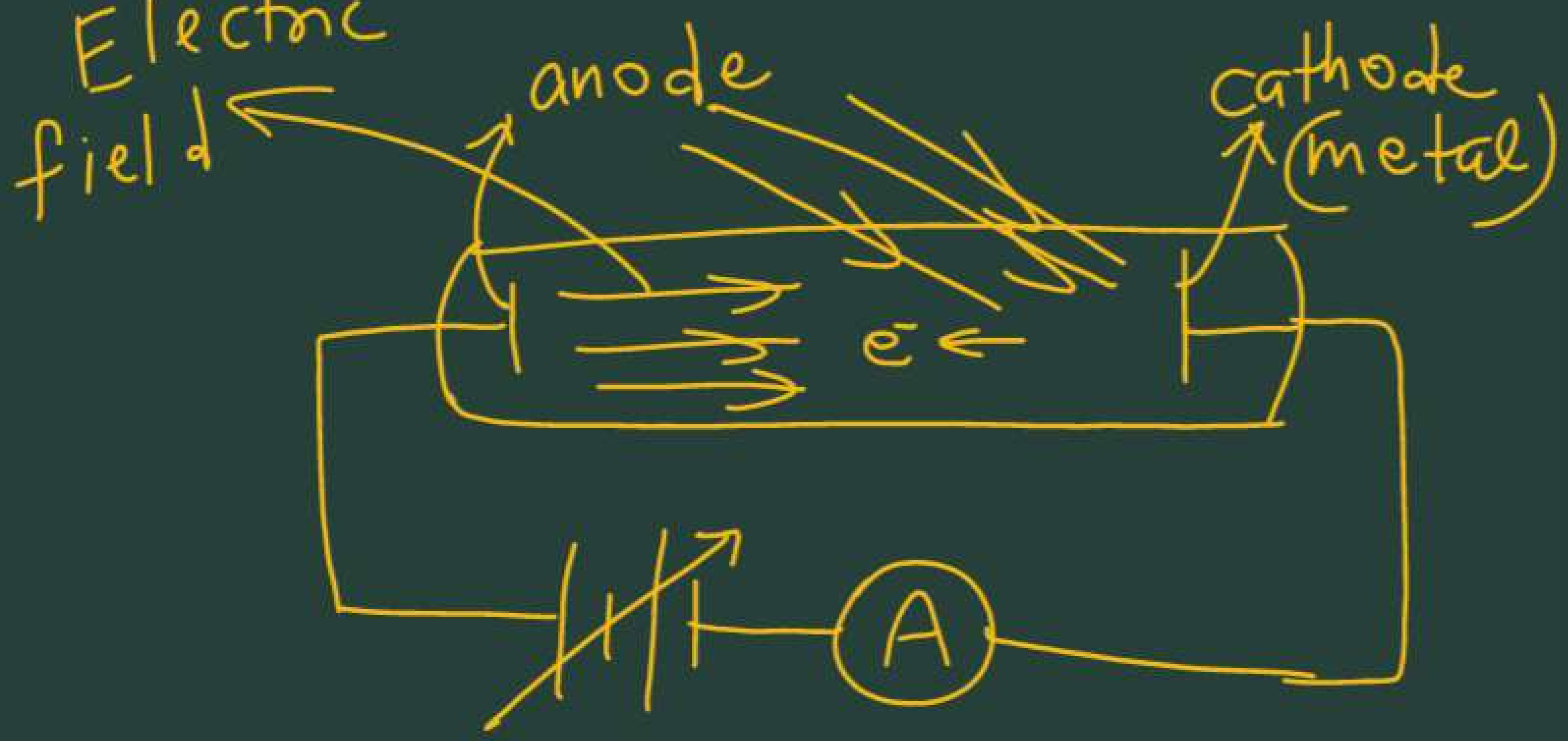
③ I_p v/s Intensity (ν const)

(Volt. const)



$$\eta = \frac{\text{no. photo } \bar{e}/s}{\text{no photons/s}} \times 100$$

Intensity:
(ν = const
no. of photons/s ↑)



Photoelectric effect expt setup.

Dep. param → I_p, K.E., V_s

Indep. — → ν, I, V, ϕ, λ_0, ν_0

6 important graphs of Photoelectric effect

ABLES KOTA

- I_p v/s V (intensity parameter)
- I_p v/s V (frequency parameter)
- I_p v/s KE distribution at cathode
- I_p v/s intensity
- KE_{max} v/s frequency
- V_s v/s frequency

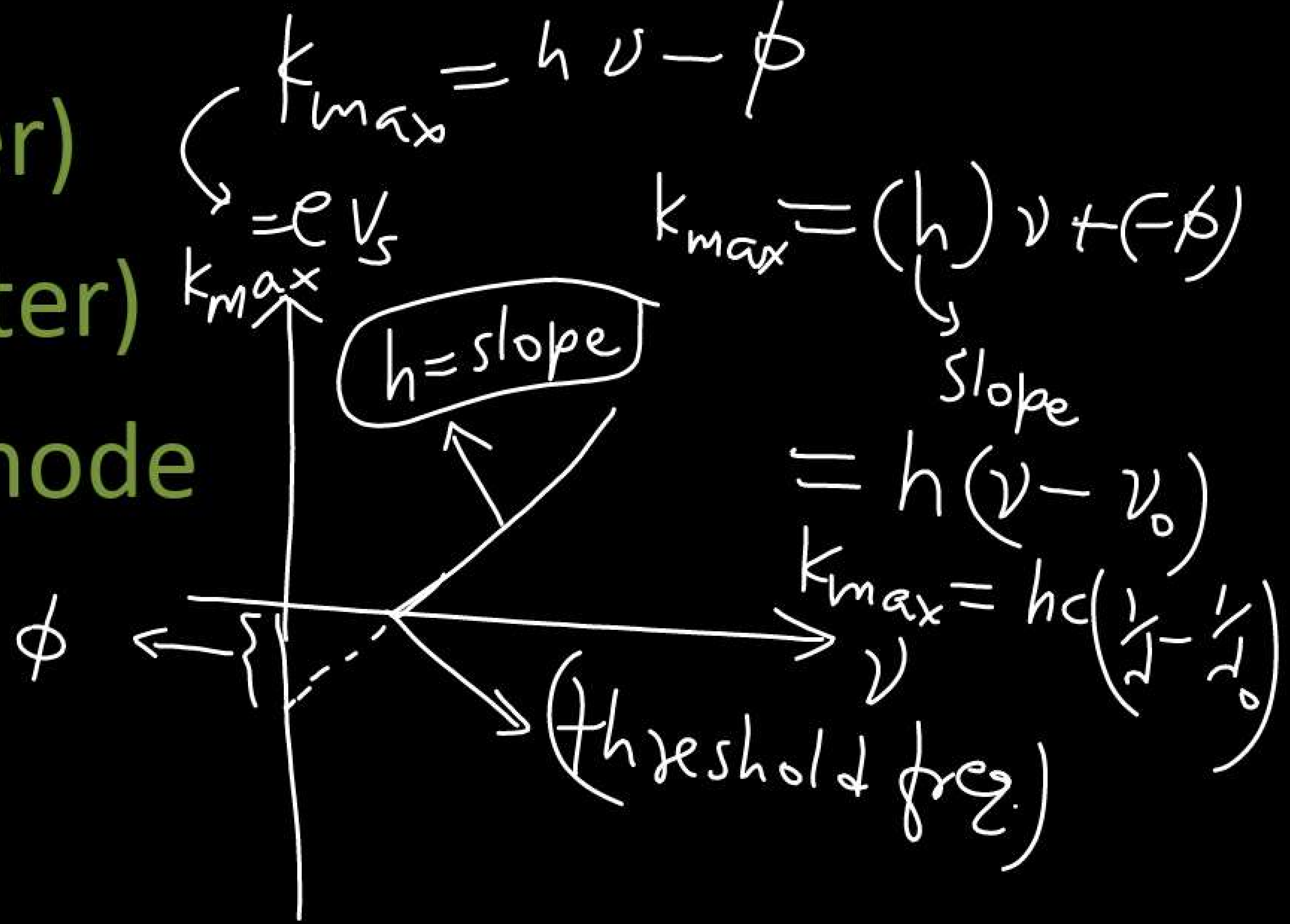
$$K_{max} = h\nu - \phi$$

$$eV_s = h\nu - \phi$$

$$V_s = \frac{h}{e}\nu - \phi$$

6 important graphs of Photoelectric effect

- I_p v/s V (intensity parameter)
- I_p v/s V (frequency parameter)
- I_p v/s KE distribution at cathode
- I_p v/s intensity
- KE_{max} v/s frequency
- V_s v/s frequency



ABLES KOTA

Q 4). If the frequency of light in a photoelectric experiment is doubled then maximum kinetic energy of photoelectron

$K_{max} = h\nu - \phi$

$K'_{max} = 2h\nu - \phi$

(A)Be doubled

(B) Be havled

$K'_{max} - K_{max} = h\nu$

(C) Become more than double than double ✓

(D) Become less

$= K_{max} + \phi$

$K'_{max} = 2K_{max} + \phi$

Q 5). In a Photoelectric experiment, if stopping potential is applied, then photocurrent becomes zero. This means that :

(A) The emission of Photoelectrons is stopped

(B) The Photoelectrons are emitted but are reabsorbed by the emitter metal

(C) the Photoelectrons are accumulated near the collector plate

(D) the Photoelectrons are dispersed from the sides of the apparatus.

Kinetic Energy in PEE

@ cathode

0 to K_{max}

$K = eV$

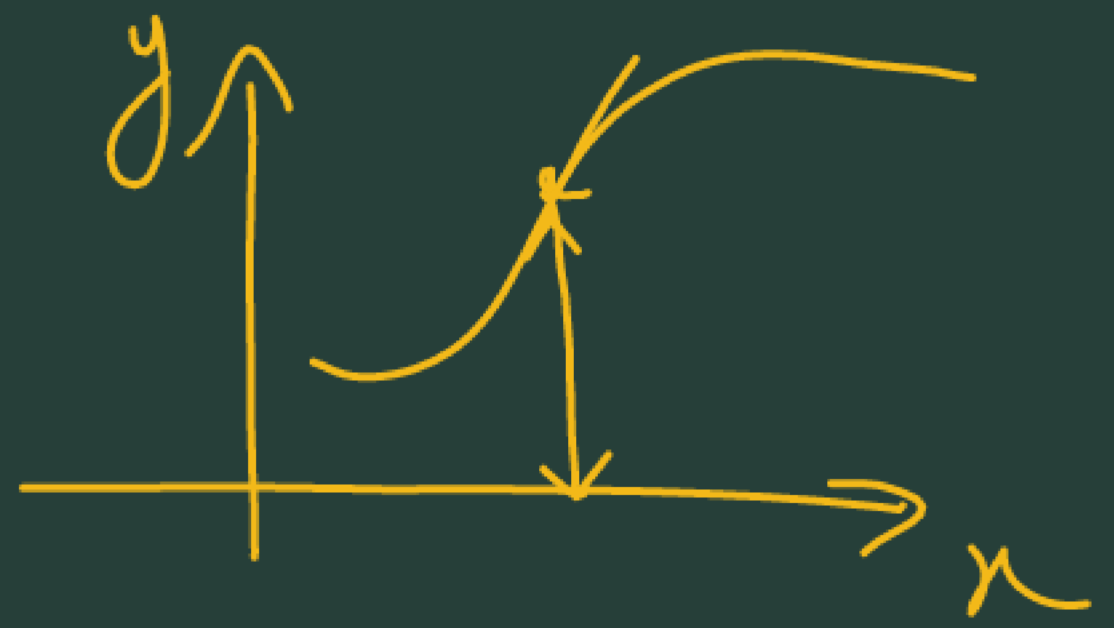
@ anode

+ve V → eV to $(K_{max} + eV)$

−ve V, $0 < |eV| < K_{max}$ → 0 to $(K_{max} - eV)$

$|eV| \geq K_{max}$ → 0

Slope & Intercept →



rate of change

→ differentiation.

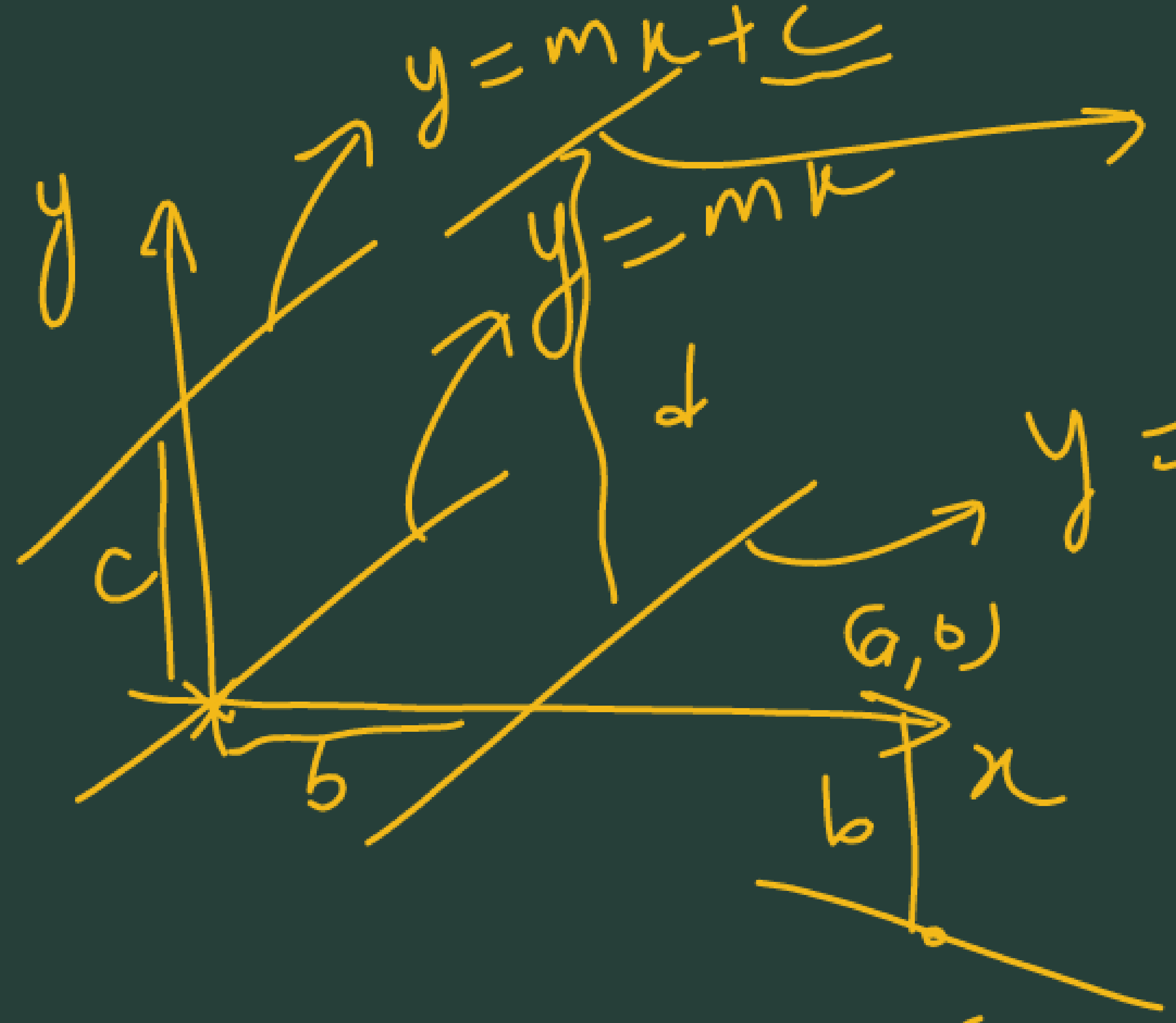
→ rotation

both are defined @ a pt on graph

Accumulation of intercept → Area under the curve

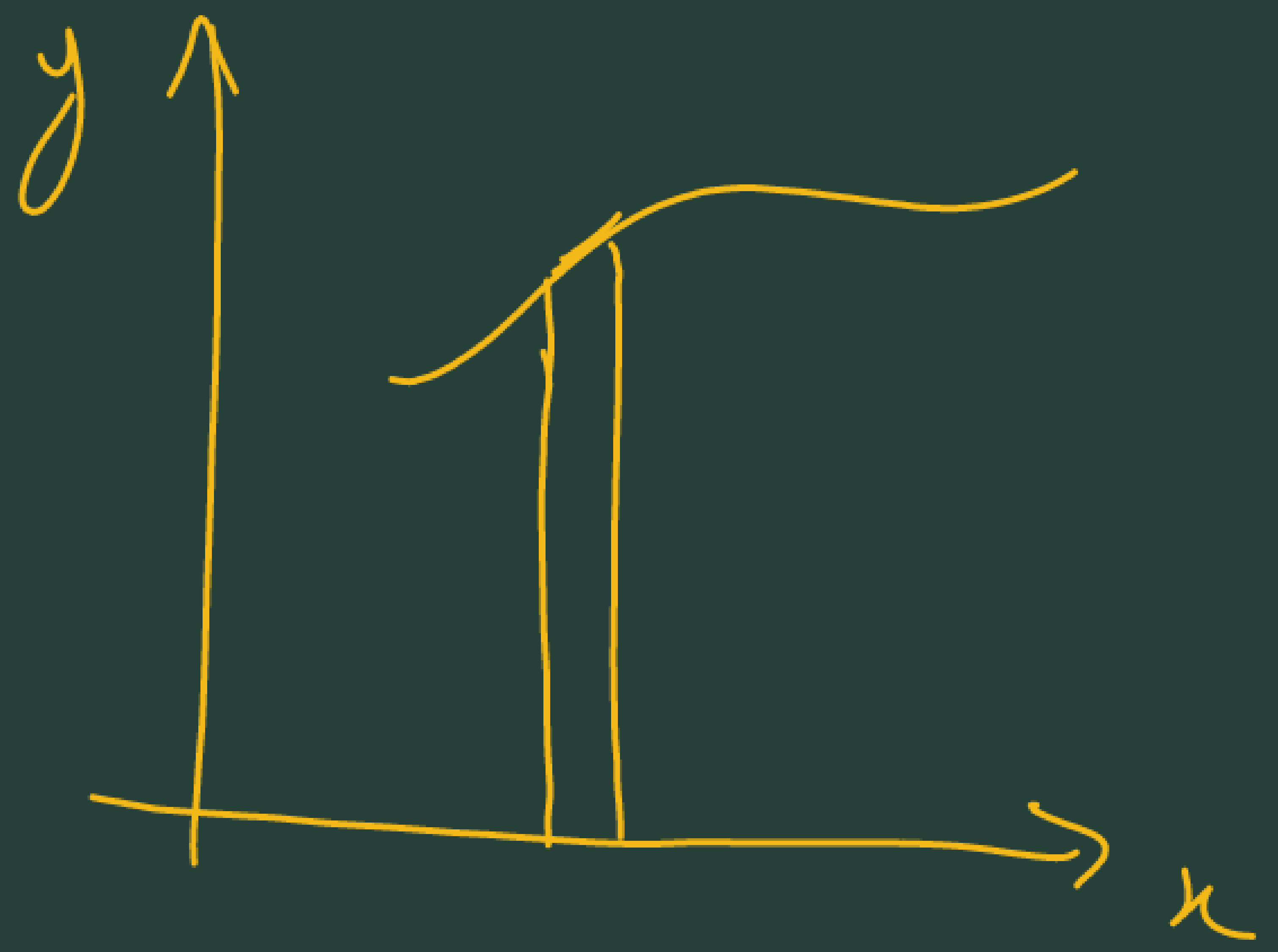
↳ integration.

shifting of curves.



$$y = m(x-b) + d$$

$$y = m(x-b)$$



(a, b), m

$$(y-b) = m(x-a)$$

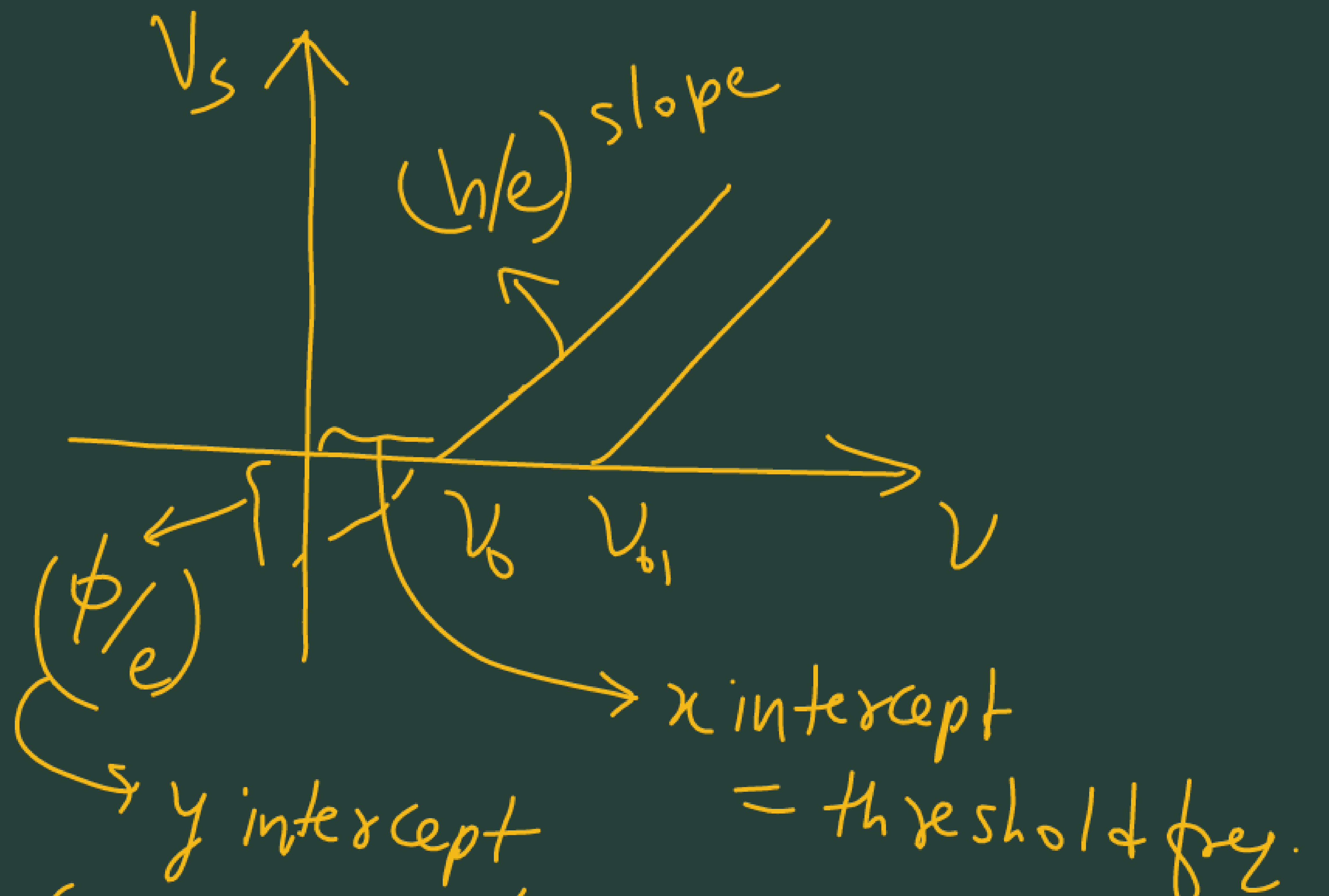
$$y = m(x-a) + b$$

$$eV_s = h\nu - \phi$$

$$V_s = \left(\frac{h}{e}\right)\nu - \left(\frac{\phi}{e}\right)$$

$$= \frac{h}{e}\nu - \frac{h}{e}\nu_0$$

$$= \frac{h}{e}(\nu - \nu_0)$$



Note → ① Graphs of (V_s v/s ν) or (K_{max} v/s ν) for different metals will be parallel (same slope), respectively.

② x-intercept denotes threshold freq of the metal.