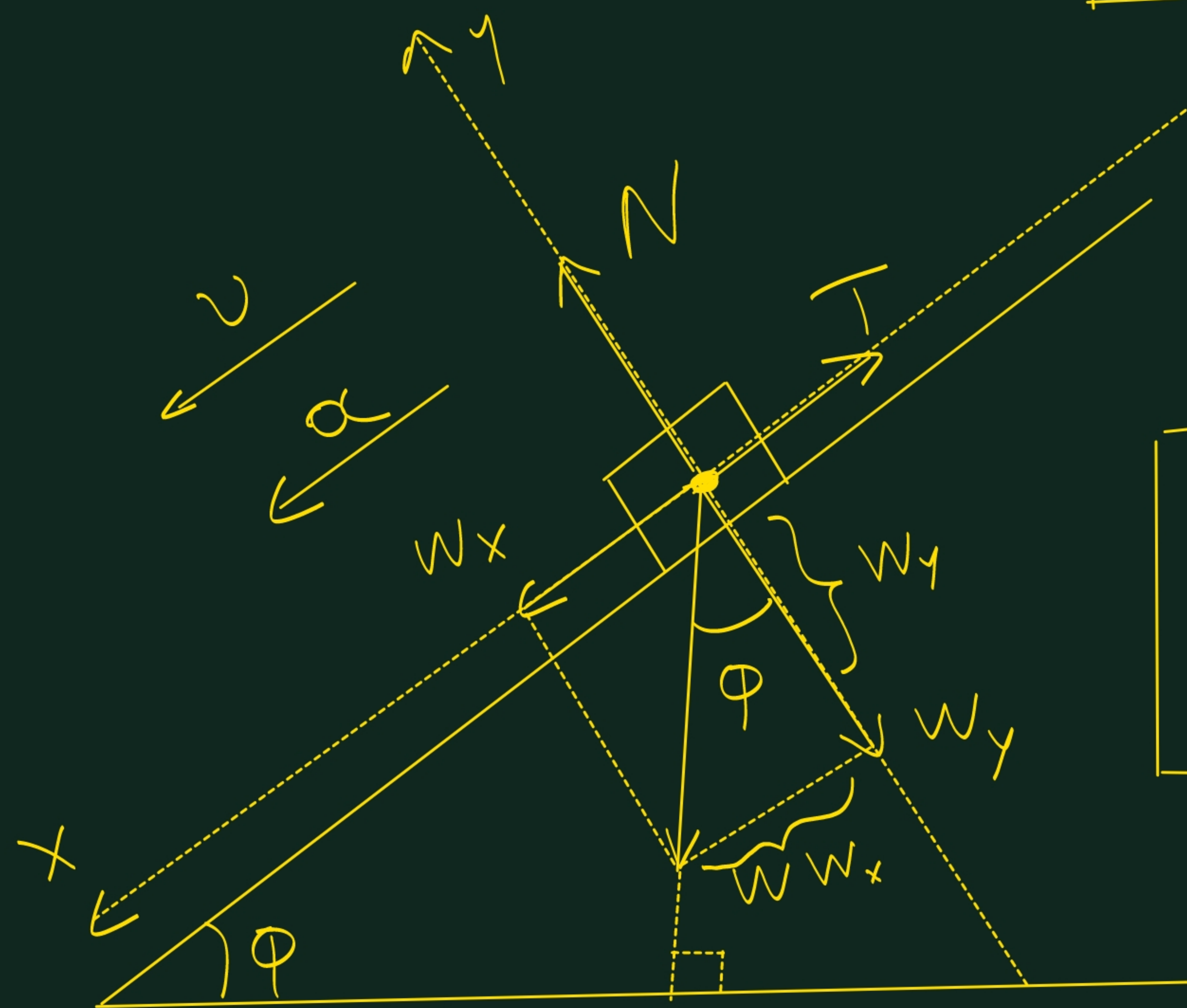


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A. Στο σώμα δρουν τρεις δυνάμεις:

1) Το βάρος $W = mg$ από τη Γη.

2) Η κάθετη δύναμη N από το κεκλιμένο επίπεδο.

3) Η τριβή T από το κεκλιμένο επίπεδο.

B. $\Sigma F_y = 0 \Rightarrow N - W_y = 0 \Rightarrow N = W \cdot \sin \phi \Rightarrow$

$$N = m \cdot g \cdot \sin \phi = 1 \cdot 10 \cdot \sin 30^\circ = 1 \cdot 10 \cdot \frac{\sqrt{3}}{2} \Rightarrow$$

$$N = 5\sqrt{3} \text{ N}$$

$$T = \mu N \Rightarrow T = \frac{\sqrt{3}}{6} \cdot 5\sqrt{3} = \frac{5 \cdot \sqrt{3}^2}{6} = \frac{5 \cdot 3}{6} \Rightarrow$$

$$T = 2,5 \text{ N}$$

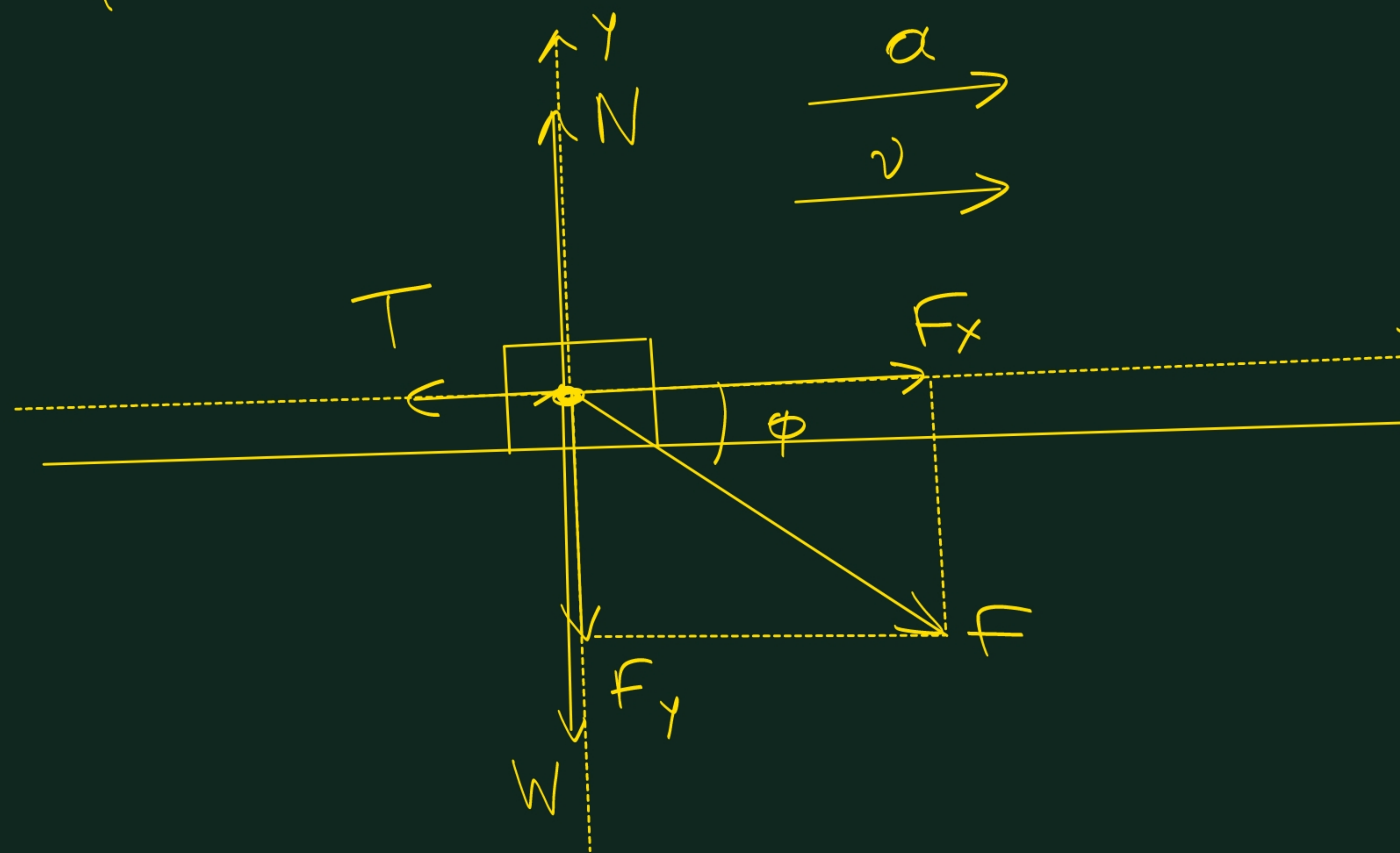
Γ. $\Sigma F_x = m\alpha \Rightarrow W_x - T = m \cdot \alpha \Rightarrow$

$$m \cdot g \cdot \sin \phi - T = m \cdot \alpha \Rightarrow$$

$$1 \cdot 10 \cdot \sin 30^\circ - 2,5 = 1 \cdot \alpha \Rightarrow 10 \cdot \frac{1}{2} - 2,5 = \alpha \Rightarrow \alpha = 2,5 \text{ m/s}^2 \text{ και}$$

$$S = \frac{1}{2} \alpha \cdot t^2 = \frac{1}{2} \cdot 2,5 \cdot 1^2 \Rightarrow S = 1,25 \text{ m}$$

Αν η δύναμη που ασκείται στο σώμα σχηματίζει γωνία προς τα κάτω, έχουμε:



$$\Sigma F_y = 0 \Rightarrow N - W - F_y = 0 \Rightarrow$$

$$N - mg - F \cdot \sin \phi = 0 \Rightarrow N = mg + F \cdot \sin \phi$$

$$T = \mu N = \mu (mg + F \cdot \sin \phi)$$

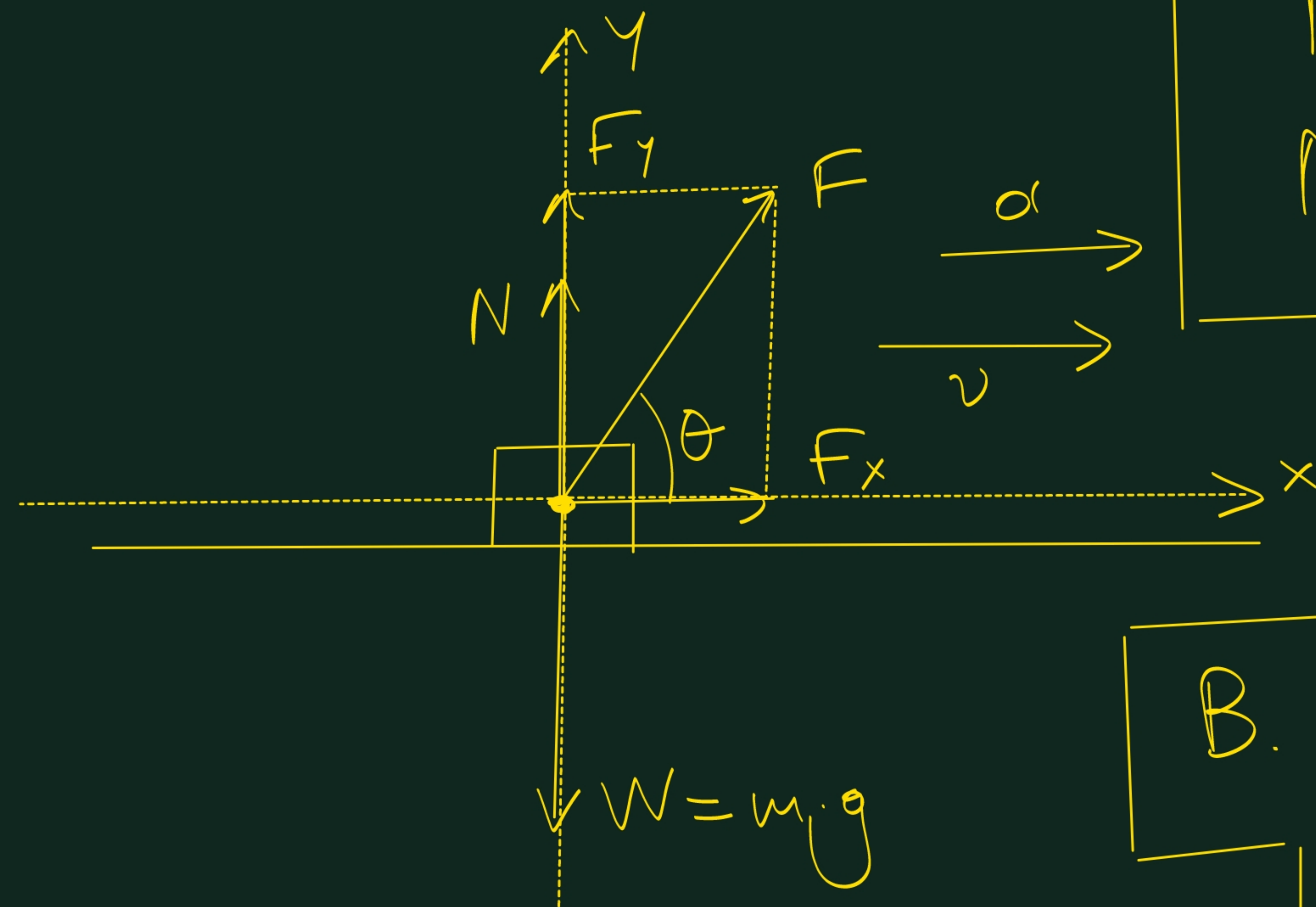
$$\Sigma F_x = ma \Rightarrow F_x - T = m \cdot a \Rightarrow$$

$$F \cdot \cos \phi - \mu (mg + F \cdot \sin \phi) = m \cdot a \Rightarrow$$

$$F \cdot \cos \phi - \mu mg - \mu F \cdot \sin \phi = m \cdot a \Rightarrow$$

$$F (\cos \phi - \mu \cdot \sin \phi) - \mu mg = m \cdot a \Rightarrow a = \dots$$

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$$A. \Sigma F_y = 0 \Rightarrow N + F_y - W = 0 \Rightarrow$$

$$N + F \cdot \sin \theta - m \cdot g = 0 \Rightarrow$$

$$N = m \cdot g - F \cdot \sin \theta \Rightarrow N = 10 \cdot 10 - 40 \cdot \sin 60^\circ \Rightarrow$$

$$N = 100 - 40 \cdot \frac{\sqrt{3}}{2} \Rightarrow N = 100 - 20\sqrt{3} \Rightarrow$$

$$N \approx 100 - 20 \cdot 1,7 = 100 - 34 \Rightarrow N \approx 66 \text{ N}$$

$$\sqrt{3} \approx 1,7$$

$$B. \Sigma F_x = m \cdot a \Rightarrow F_x = m \cdot a \Rightarrow F \cdot \cos \theta = m \cdot a \Rightarrow$$

$$40 \cdot \cos 60^\circ = 10 \cdot a \Rightarrow 40 \cdot \frac{1}{2} = 10 \cdot a \Rightarrow a = 2 \text{ m/s}^2$$

$$v = a \cdot t \Rightarrow v = 2 \cdot 5 \Rightarrow v = 10 \text{ m/s}$$

r. $0 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5$
 $1^\circ \quad 2^\circ \quad 3^\circ \quad 4^\circ \quad 5^\circ$

$$S = S(5) - S(4) = \frac{1}{2} \cdot a \cdot 5^2 - \frac{1}{2} \cdot a \cdot 4^2 = \frac{1}{2} \cdot 2 \cdot 25 - \frac{1}{2} \cdot 2 \cdot 16 = 25 - 16 \Rightarrow S = 9 \text{ m}$$