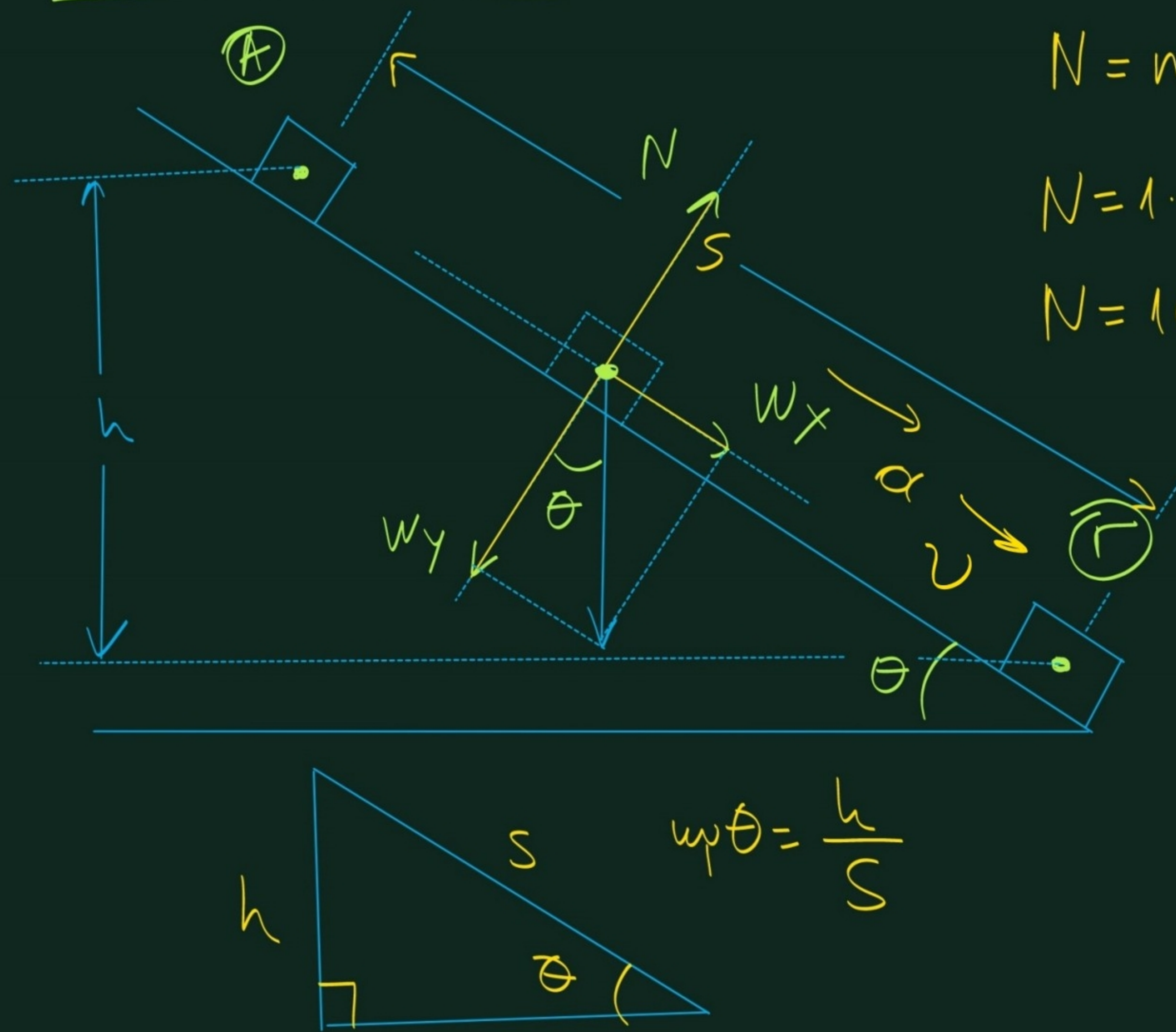


Atu. 24 ex. 159.



$$a) \Sigma F_y = 0 \Rightarrow N = W_y \Rightarrow N = W \cdot \sin \theta \Rightarrow$$

$$N = mg \cdot \sin \theta \Rightarrow$$

$$N = 1 \cdot 10 \cdot \sin 30^\circ \Rightarrow$$

$$N = 10 \cdot \frac{\sqrt{3}}{2} \Rightarrow$$

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

$$b) \Sigma F_x = m a \Rightarrow$$

$$W_x = m a \Rightarrow$$

$$W \cdot \sin \theta = m a \Rightarrow$$

$$a = g \cdot \sin \theta \Rightarrow$$

$$a = 10 \cdot \sin 30^\circ = 10 \cdot \frac{1}{2} = 5 \text{ m/s}^2$$

$$d) h = 5 \text{ m}$$

$$S = \frac{h}{\sin \theta} \Rightarrow$$

$$S = \frac{5}{\sin 30^\circ} = \frac{5}{\frac{1}{2}} = 10 \text{ m}$$

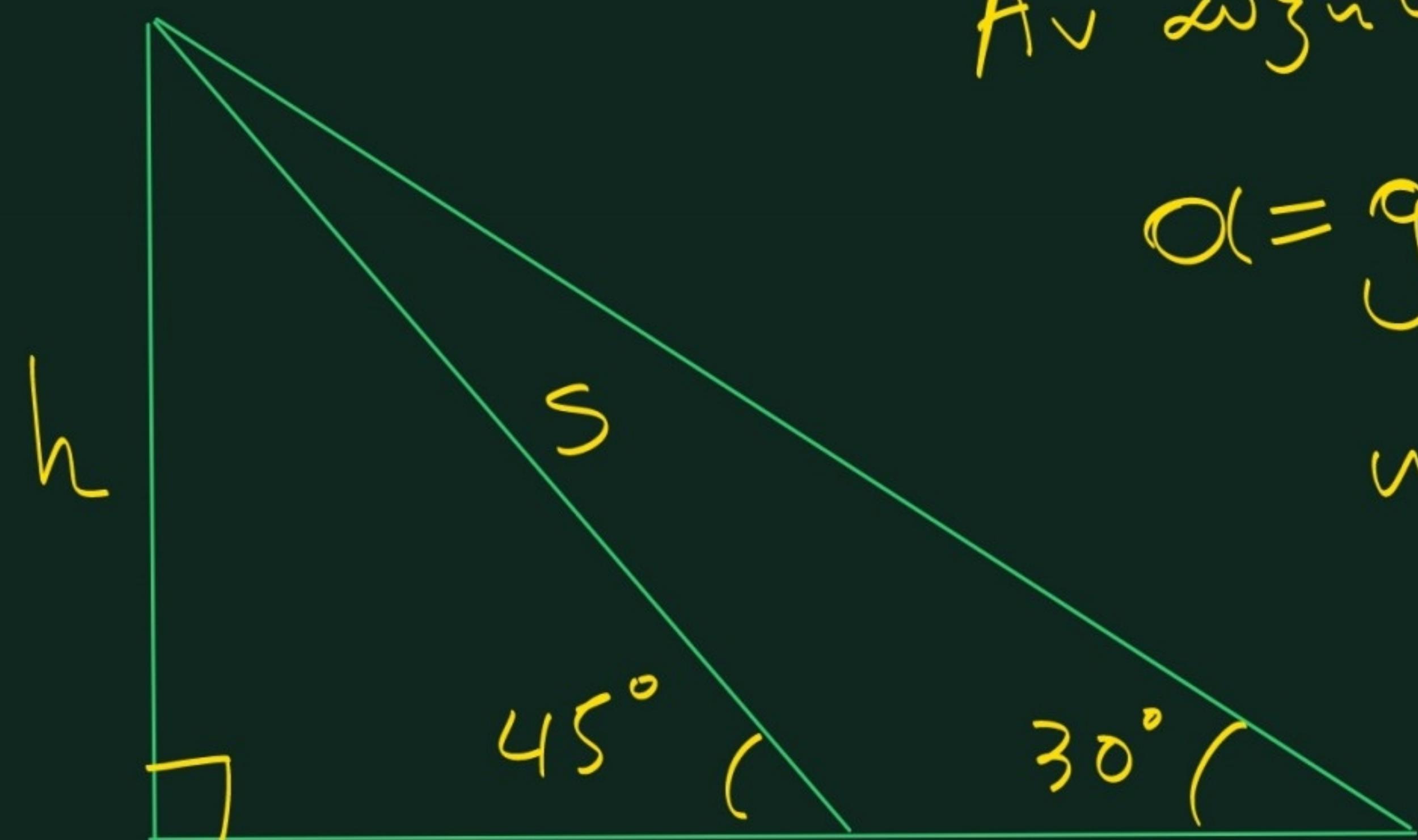
$$S = \frac{1}{2} a t^2 \Rightarrow 10 = \frac{1}{2} \cdot 5 \cdot t^2 \Rightarrow$$

$$20 = 5 t^2 \Rightarrow t^2 = 4 \Rightarrow t = 2 \text{ sec}$$

$$v = a t = 5 \cdot 2 \Rightarrow$$

$$v = 10 \text{ m/s}$$

δ)



Αν ωξυθεί η υλίκη έχουμε:

$$\alpha = g \sin \theta = 10 \cdot \sin 45^\circ = 10 \frac{\sqrt{2}}{2} = 5\sqrt{2} \text{ m/s}.$$

$$\sin \theta = \frac{h}{s} \Rightarrow s = \frac{h}{\sin \theta} = \frac{5}{\sin 45^\circ} = \frac{5}{\frac{\sqrt{2}}{2}} = \frac{10}{\sqrt{2}} \Rightarrow$$

$$s = \frac{10\sqrt{2}}{\sqrt{2}} \Rightarrow s = 10 \text{ m}.$$

$$s = \frac{1}{2} \alpha t^2 \Rightarrow 10 = \frac{1}{2} \cdot 5\sqrt{2} \cdot t^2 \Rightarrow t^2 = 2 \Rightarrow t = \sqrt{2} \text{ sec}$$

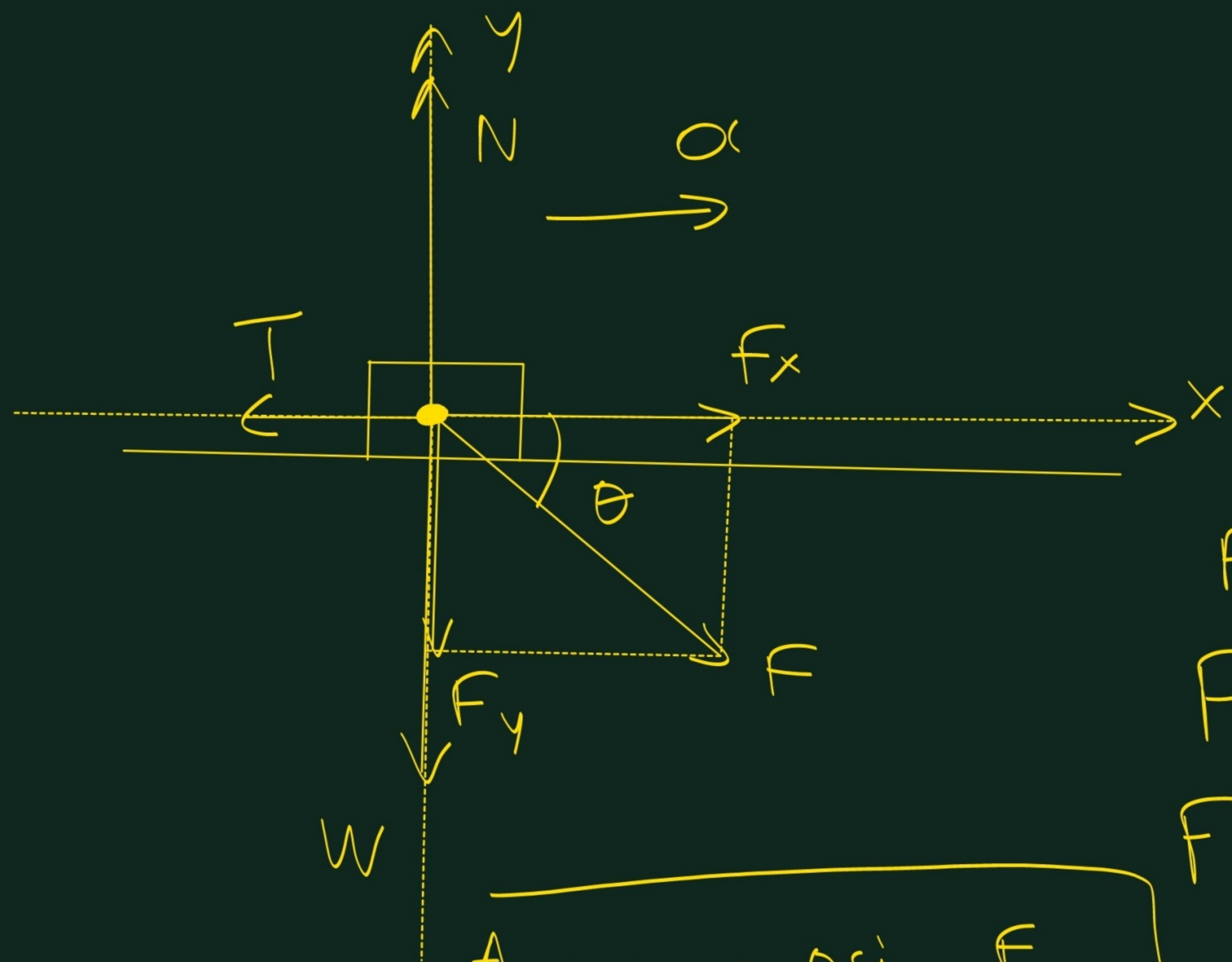
Αλλά: $U = \alpha t \Rightarrow U = 5\sqrt{2} \cdot \sqrt{2} \Rightarrow U = 10 \text{ m/s}$ → πάλι ίδια ταχύτητα.

Από διατήρηση ενέργειας:

$$mgh = \frac{1}{2} m v^2 \Rightarrow U = \sqrt{2gh}$$

ανεξάρτητα
της υλίκης

$$U = \sqrt{2 \cdot 10 \cdot 5} = \sqrt{100} = 10 \text{ m/s}.$$



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

$$N = F \cdot \sin \theta + mg$$

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

$$\Sigma F_x = ma \Rightarrow F_x - T = ma \Rightarrow$$

$$F \cdot \cos \theta - \mu (mg + F \cdot \sin \theta) = ma \Rightarrow$$

$$F \cdot \cos \theta - \mu mg - \mu F \cdot \sin \theta = ma \Rightarrow$$

$$F \cdot (\cos \theta - \mu \sin \theta) - \mu mg = ma \Rightarrow$$

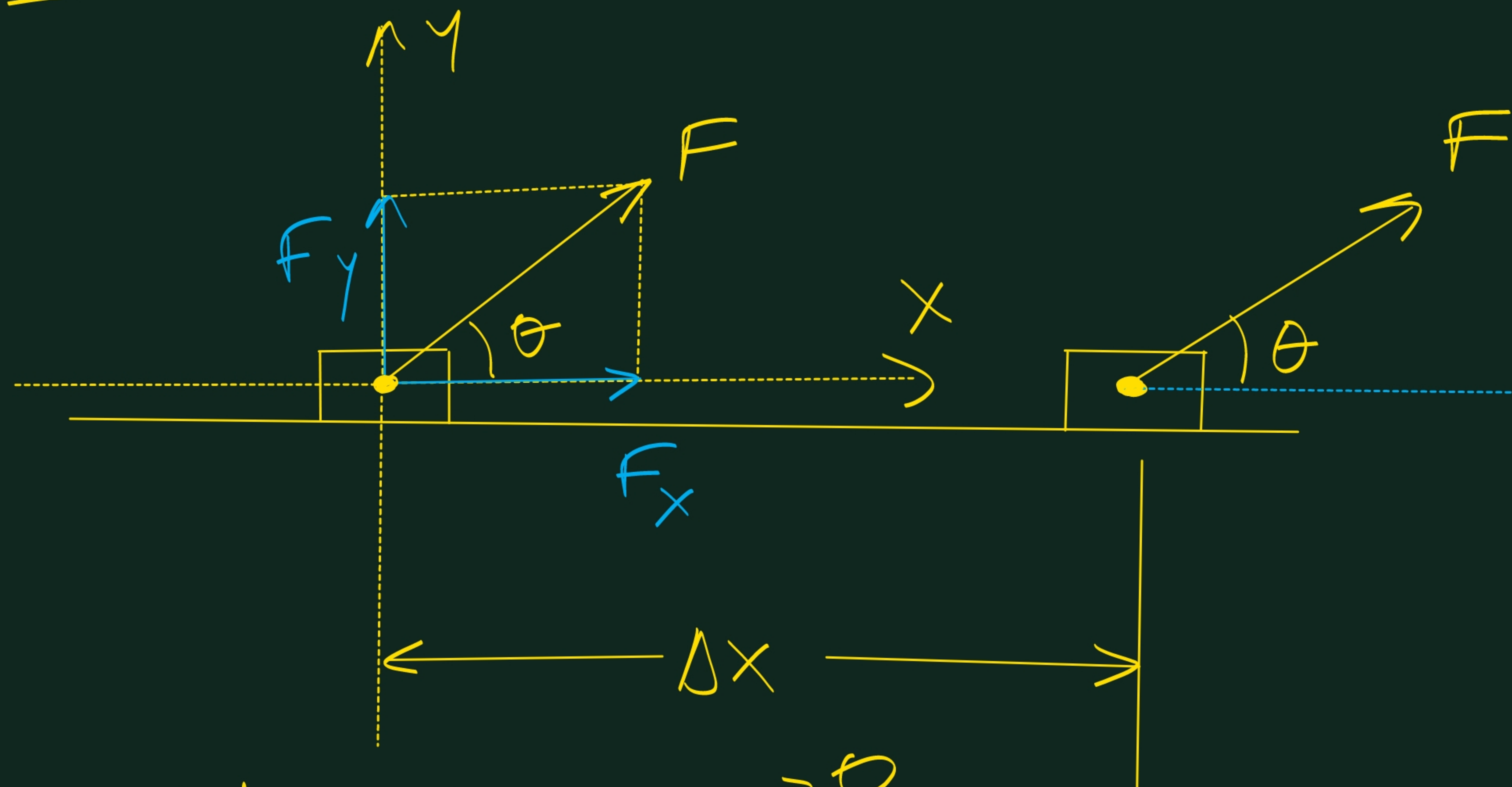
$$a = \dots$$

Αν υπαρχούσε η F

έχουμε πάλι ευθύγραμμότυπη κ

$$\Sigma F_x = ma' \Rightarrow T' = ma' \Rightarrow \mu N' = ma' \Rightarrow \mu mg = ma' \Rightarrow a' = \mu g \text{ (ευθύγραμμη)}$$

Εργο δύναμης



$$W_F = W_{F_x} + W_{F_y} = F_x \cdot \Delta x = F \cdot \cos \theta \cdot \Delta x$$

επειδή

$$\vec{F}_y \perp \Delta \vec{x}$$

Από γεωμ:

$$W_F = F \cdot \Delta x \cdot \cos \theta$$

$$A_v \quad 0 < \theta < 90^\circ$$

$$W_F > 0$$

$$A_v \quad 90^\circ < \theta < 180^\circ$$

$$W_F < 0$$

$$A_v \quad \theta = 90^\circ$$

$$W_F = 0$$

$$A_v \quad \theta = 0^\circ$$

$$W_F = F \cdot \Delta x$$