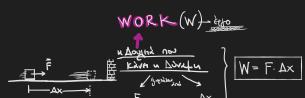
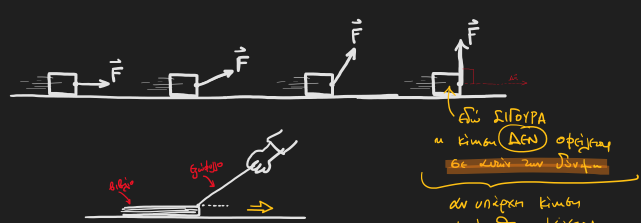
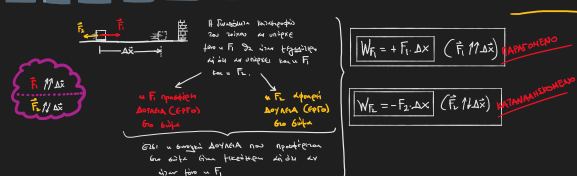


ΕΡΓΟ ΔΥΝΑΜΗΣ

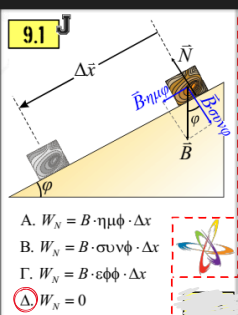


James Prescott Joule
Μετρήθηκε (σε 1 Joule)
1 Joule = 1 J = 1 N · m



$$dW: \vec{F} \perp d\vec{x} \Rightarrow W_F = 0$$

η δύναμη...



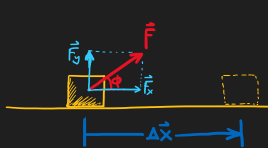
$$\vec{N} \perp \Delta \vec{x} \Rightarrow W_N = 0$$

$$W_{B,y} = B_y \cdot \Delta x = B \cdot \sin \phi \cdot \Delta x$$

$$W_{B,x} = B_x \cdot \Delta x = B \cdot \cos \phi \cdot \Delta x$$

$$W_B = B \cdot \Delta x$$

ΓΕΝΙΚΟΣ (i) ΤΥΠΟΣ ΕΡΓΟΥ



$$W_F = W_{F_x} + W_{F_y} = F_x \Delta x + F_y \Delta y = F \cos \phi \Delta x + F \sin \phi \Delta y = F \Delta r \cos \phi$$

ΛΑΘΟΣ

$$W_F = F \Delta x \cos \phi = F \Delta x \cos 0^\circ = F \Delta x \cdot 1 = F \Delta x$$

$$W_F = F \Delta x \cos \phi = F \Delta x \cos 90^\circ = F \Delta x \cdot 0 = 0$$

$$W_F = F \Delta x \cos \phi = F \Delta x \cos 180^\circ = F \Delta x \cdot (-1) = -F \Delta x$$

$+F \cdot \Delta x$	 $\vec{F} \uparrow \uparrow \Delta \vec{x}$	
$-F \cdot \Delta x$	 $\vec{F} \uparrow \downarrow \Delta \vec{x}$	
0	 $\vec{F} \perp \Delta \vec{x}$	
$F \cdot \Delta x \cdot \cos \phi$	 $\phi \neq 0^\circ, 90^\circ, 180^\circ$	
$W = \int F dx$	 $F = f(x)$	

ΕΡΓΟ ΚΕΝΤΡΙΚΗΣ ΔΥΝΑΜΕΩΣ

$$F = 2 + 3x, W_F = ? \quad x = 2 \dots 4 \text{ m}$$

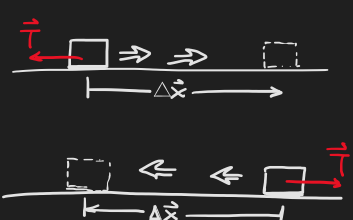
$$x = 2 \text{ m}: F = 2 + 3 \cdot 2 = 2 + 6 = 8 \text{ N}$$

$$x = 4 \text{ m}: F = 2 + 3 \cdot 4 = 2 + 12 = 14 \text{ N}$$

$$W = \int_2^4 (2 + 3x) dx = \left[2x + \frac{3}{2}x^2 \right]_2^4 = 2 \cdot 4 + \frac{3}{2} \cdot 16 - \left(2 \cdot 2 + \frac{3}{2} \cdot 4 \right) = 8 + 24 - (4 + 6) = 22 \text{ J}$$

$$W = \int_2^4 (-kx) dx = \left[-\frac{k}{2}x^2 \right]_2^4 = -\frac{k}{2} \cdot 16 - \left(-\frac{k}{2} \cdot 4 \right) = -8k + 2k = -6k$$

ΕΡΓΟ ΤΡΙΒΗΣ ΟΛΙΘΩΣ



$$W_T = -T \cdot \Delta x$$

ΕΚΤΟΣ ΥΛΗΣ