

Chapter 6 - Work, Power + Energy

§6-1 Work + Energy

Work is not energy but rather it is related to the energy transferred to an object.
(mechanical)

Work is the product of the force acting on an object and its displacement. The force must be parallel to the displacement.

$$W = F_{||} \Delta d$$

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Where W is the work done ($N \cdot m$ or J)

$F_{||}$ is the force acting parallel to displacement (N)

Δd is the displacement (m)

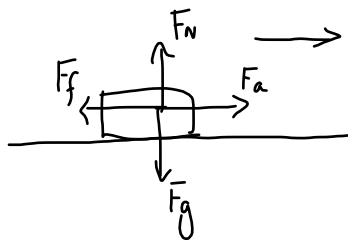
* Work is a SCALAR quantity.

MP|220

$$F_a = 2.00 \times 10^2 N$$

$$\Delta d = 3.00 m$$

$$W = ??$$



Since F_a is in the same direction as the displacement, F_a is parallel to Δd .

$$W = F_{||} \Delta d$$

$$W = (2.00 \times 10^2 N)(3.00 m)$$

$$W = 6.00 \times 10^2 J$$

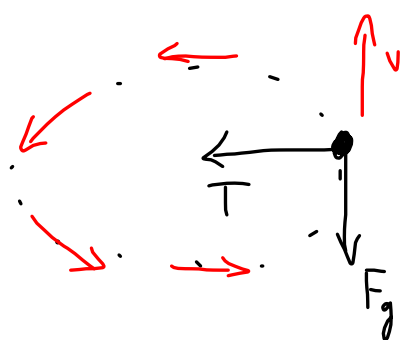
The girl does $6.00 \times 10^2 J$ of work on the desk.

Situations in which no work is done:

1. When the object does not move (i.e. $\Delta d = 0$)
2. When there is uniform motion with no force acting (i.e. $F_{||} = 0$)
3. When the force is perpendicular to the displacement

SEE: p222-223

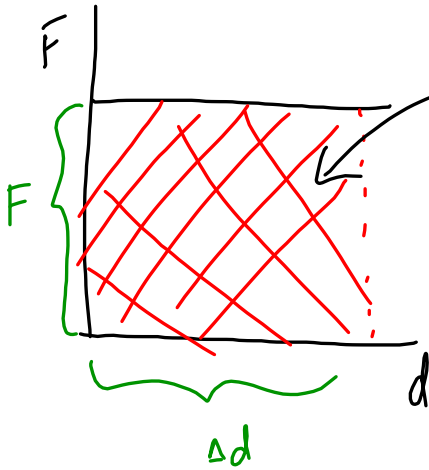
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At any point, the tension (T) is perpendicular to the instantaneous velocity

So
No WORK is done!

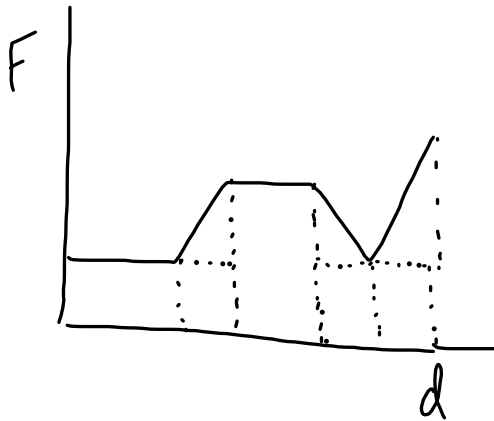
Consider a constant force acting on an object:



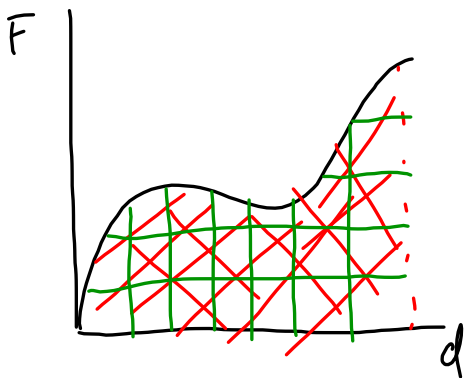
area of rectangle = $l \times w$

$$\text{area} = F \Delta d$$

So the area $(F \cdot d) = \text{WORK}$



← Add together all the pieces
(see mp/227)



← count squares ✓

⊙ or

use technology ✓

⊙ or

use calculus. (later)