

Work & Energy

Tuesday, April 18, 2017 8:56 AM

Energy - power
 - electrical
 - motion (kinetic)

heat work lameo answer by tea: Ability

Energy is the ability to do work } W & E are
work is the change in energy } interconnected

Units: Joules (J), kJ

$$1) \text{ Work} = \underline{F} \cdot d$$

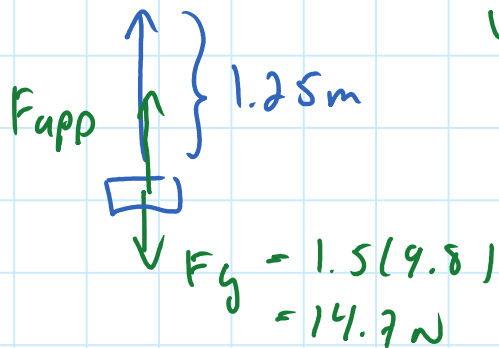
parallel to applied force
the distance moved

$$2) W = \Delta E$$

ex: How much work is done on a desk
by a person pushing it 2m with an applied
force of 75N

$$W = F \cdot d \\ = (75\text{N})(2\text{m}) = 150\text{J}$$

ex) Tea litts & drops a 1.5kg textbook, 1.25m
10x. Find work done.



$$W = F_{app} \cdot d$$

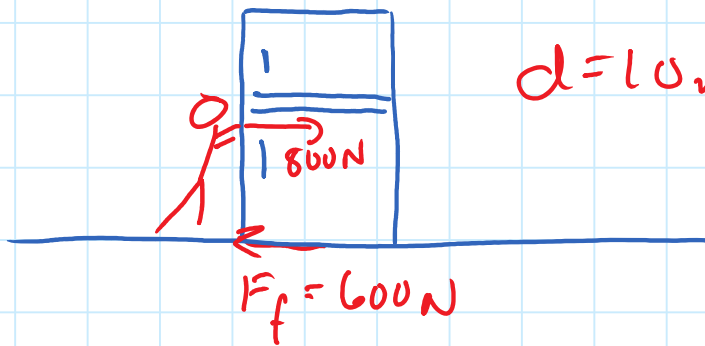
$$= (14.7)(1.25) \times 10$$

$$= 183.75 \text{ J}$$

~~1830000~~
~~183000 J~~

184 J

Ex

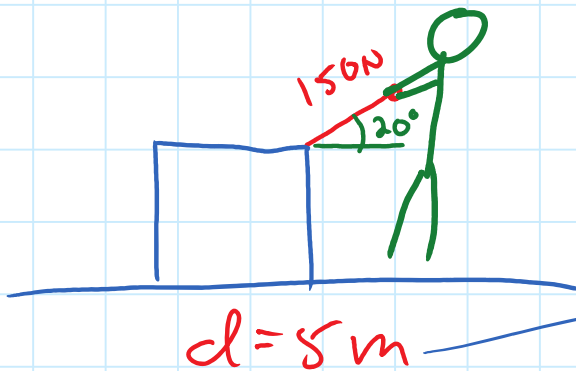


$$W = ? \cdot F_{app} \cdot d$$

$$= 800 \text{ N} \cdot 10 \text{ m}$$

$$= 8000 \text{ J}$$

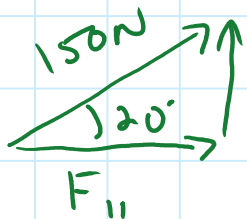
Ex



Work done on box?

$$W = F \cdot d$$

$$W = 705 \text{ J}$$



$$\cos 20^\circ = \frac{F_{||}}{150}$$

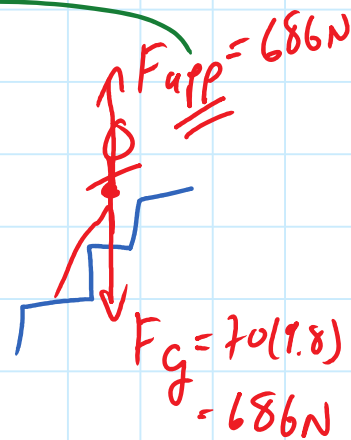
$$F_{||} = 150 \cos 20^\circ = 141 \text{ N}$$

Power - the rate at which energy is used or work is done.

$$P = \frac{W}{t} = \frac{\Delta E}{t}, \text{ units } \frac{\text{J}}{\text{s}}, \text{ Watts (W)}$$

ex: How much power is developed by a 70 kg person running up a 3.0 m flight of stairs in 3.2 s

$$P = \frac{W}{t} = \frac{F_{\text{app}} \cdot d}{t} \\ = \frac{(686 \text{ N})(3.0 \text{ m})}{3.2 \text{ s}} \\ = 643 \text{ W}$$



Ex How much energy is required for a 600 W microwave to run for 10 minutes $\times 60$

$$(t) P = \frac{W}{t} = \frac{\Delta E}{t} \quad E = P \cdot t \\ = (600 \text{ W})(600) \\ = 360000 \text{ J} \\ = 360 \text{ kJ}$$