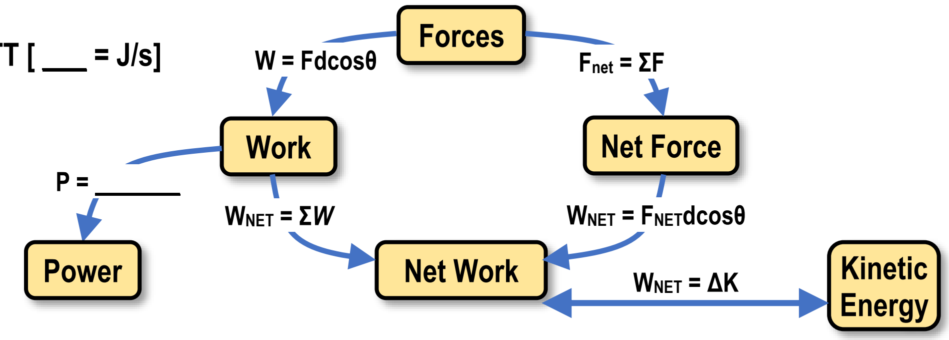
CONCEPT: INTRODUCTION TO POWER

● Often times you'll need to calculate how *quickly* work is being done or transferred to an object. This is called **POWER.**

$P_{avg} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$ → Unit: **WATT [___ = J/s]**



EXAMPLE 1: How many joules of energy does a 100-watt light bulb use per hour?

EXAMPLE 2: A 1300 kg sports car accelerates from rest to 40m/s in 7s. What is the average power delivered by the engine?

PROBLEM: How much power must an elevator motor supply in order to lift a 1000 kg elevator at constant speed a height of 100m in 50 seconds?

A) 100,0000 W
B) 0 W
C) 2,000 W
D) 19,600 W

WORK & ENERGY
$KE = \frac{1}{2}mv^2$
$W = Fd\cos\theta$
$W_g = -mg\Delta y$
$W_s = -\frac{1}{2}k\Delta x^2$
$W_{NET} = \Sigma W = F_{NET}d\cos\theta = \Delta K$
$P_{avg} = \frac{W}{\Delta t} = \frac{E}{\Delta t}$

PROBLEM: A 15 kg block is accelerated at 2.0 m/s^2 along a horizontal frictionless surface, with its speed increasing from 10 m/s to 30 m/s. Calculate **a)** the change in the block's mechanical energy and **b)** the average rate at which energy is transferred to the block.

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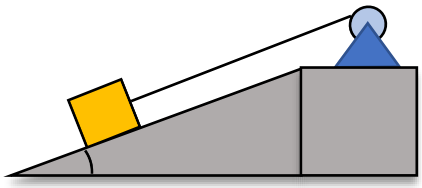
PROBLEM: A 1400 kg block of granite at the bottom of a 37° incline is pulled up at constant speed by a cable and winch. The coefficient of kinetic friction is 0.4. If the block is pulled up the incline in 25s, and the incline is 60.2m tall, what is the power due to the force of the cable?



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