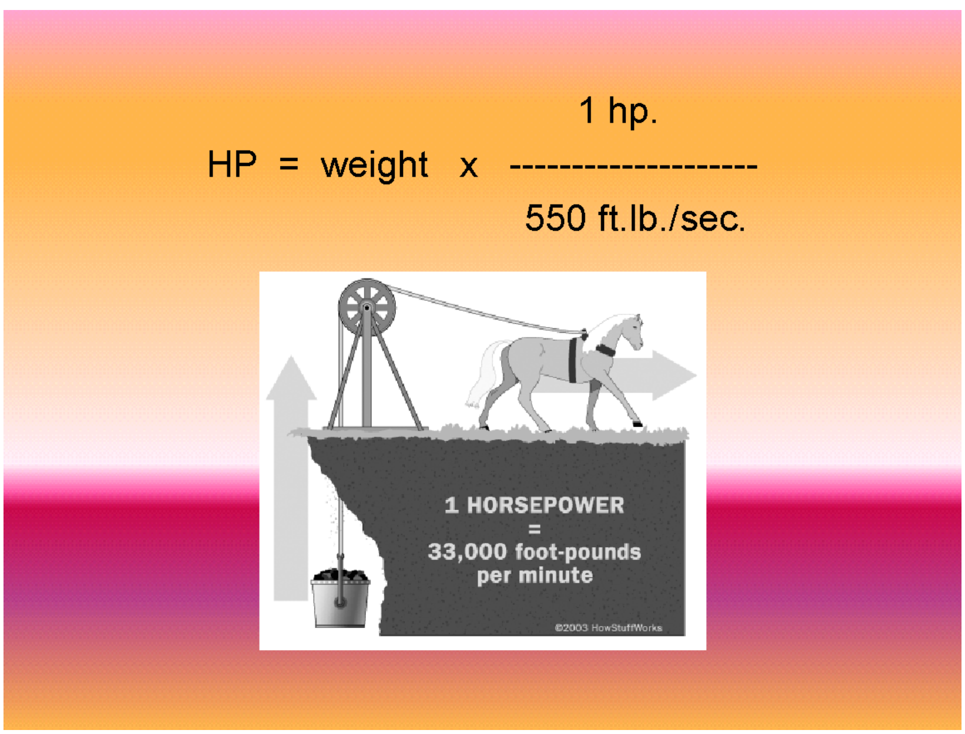
POWER

Which takes more work; walking up a flight of stairs or running up the same flight of stairs? Neither... both scenarios require the same amount of work, but you have to expend energy quicker running up the stairs. Work is force multiplied by distance. Power is work with a time component. It is with power that we can measure an electric go-kart's efficiency. The closer you match the power available from the batteries to the power the kart requires at speed, the greater the efficiency. With the careful use of Volt and Ampere meters that you can isolate where inefficiency hides in your car. Each time you remove or lower inefficiency, the amperage draw decreases, efficiency increases, and you finish out the rally with a bigger smile. Power, simply put is...

It befuddles many to think they are worth less than one horsepower, but we are. The most "powerful" man, a small fella, produced a sustained 1/3 horsepower for a couple of hours as he flew a man-powered plane over the English Channel. If you can pick up 550 pounds over a distance of 1 foot in 1 second, then you are worth 1 horsepower.



In electrical terms, Volts multiplied by amperes equals Watts. Engineers determined 746 Watts is equivalent to 1 horsepower. Battery packs provide "power" and electrical loads consume "power". A comparison of these powers will tell you about an electrical system's efficiency.

electrical power and efficiency

$P = V \times I$

efficiency = $(Power_{out} / Power_{in}) \times 100\%$

1 horsepower = 746 Watts

in class assignment

The motor in this early electric car produces 3 rated horsepower at 24 Volts while drawing a current of 80 amps.

Find the input power and efficiency of the motor.

$P_{in} = V \times I$

$P_{in} = 24\ V \times 80\ A$

$P_{in} = 1920\ VA$

$P_{in} = 1920\ Watts$

$P_{out} = 3\ hp. \ X\ (746\ Watts / hp.)$

$P_{out} = 2238\ Watts$

$Efficiency = (P_{in} / P_{out}) \times 100\%$

$Efficiency = (1920\ Watts / 2238\ Watts) \times 100\%$

$Efficiency = 0.857 \times 100\%$

$Efficiency = 85.7\%$

ASSIGNMENT: When the racing season rolls, you will be able to compile data from your rallies and determine the efficiency of your electric go-kart. For example, one of my cars used a motor rated at 3 hp and consumed 19A at 24V for the duration of the race. What is the efficiency of that car? A different car of mine used the same motor and consumed 37A at 24V. What is the efficiency of that car? Given that the tires, wheels, batteries, motor, track, and speed were the same between the two cars, what do you suppose caused such a drastic difference in efficiency?

Manpowered flight

https://www.bing.com/videos/search?q=man+powered+flight+across+the+english+channel&&view=detail&mid=E25469E7FC00700E768BE25469E7FC00700E768B&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3Dman%2520powered%2520flight%2520across%2520the%2520english%2520channel%26qs%3Dn%26form%3DQBVR%26sp%3D-1%26ghc%3D1%26pq%3Dman%2520powered%2520flight%2520across%2520the%2520english%2520channel%26sc%3D0-45%26sk%3D%26cvid%3DC3DED4E454AF44F1895E5BE07F882715

measuring horsepower

https://www.bing.com/videos/search?q=measuring+horsepower&&view=detail&mid=29915F502C7338BEA16629915F502C7338BEA166&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3Dmeasuring%2520horsepower%26qs%3Dn%26form%3DQBVR%26sp%3D-1%26ghc%3D1%26pq%3Dmeasuring%2520horsepower%26sc%3D1-20%26sk%3D%26cvid%3D30387A388AAA43B1B3973A35AB703EC3