

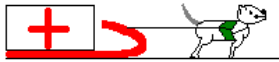
Physics I

Power

$$\text{Power} = \frac{\text{Work}}{\text{time}} \text{ or } \text{Power} = Fv \cos \angle_F^v$$

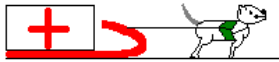
$$1 \text{ HP} = 746 \text{ W}$$

Problem 1.- Calculate the power delivered by a dog who pulls a sled a constant speed of 2.5 m/s. Consider the mass of the sled to be 45 kg and the coefficient of friction between sled and ice to be $\mu = 0.085$



Problem 1a.- Calculate how many dogs you need to pull a loaded sled at constant speed of 1.5 m/s knowing that the mass of the sled plus its cargo is 450 kg and the coefficient of friction between sled and ice is $\mu = 0.085$

Consider that 1 DP (dog power) is 94 watts.

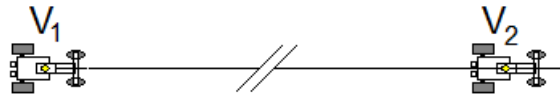


Problem 2.- At what rate (power) is a 45.0 kg boy using energy when he runs up a flight of stairs 10.0 m high in 8.0 s?

Problem 2a.- At what rate (power) is a firefighter using energy when he climbs up the stairs of a building 40.0 m high in 68 s? Consider the mass of the firefighter to be 75 kg and the gear he is carrying an additional mass of 30 kg.

Problem 3.- How much power do you need to pump 100 kg of water per second to a height of 15.3 m? Assume 100% efficiency.

Problem 4.- An 800-kg sports car accelerates from rest to 100km/h in 6.0s. How much average power is delivered by the engine? Give the answer in HP.



Problem 5.- A Ferrari 612 Scaglietti has an engine that delivers a power of 540 HP at 7,250 rpm. Find the torque in Nm at this peak condition.

Problem 6.- An 80kg skydiver leaps out of an air balloon and quickly reaches a terminal speed of 110 m/s. Calculate the power delivered by air resistance.

Problem 7.- A cyclist does work at 600 W while riding. How much force is applied on the bicycle if its speed is 8.0 m/s?