

Power

Power is the rate at which work is done or energy is transferred over time. It quantifies how quickly work can be performed or energy can be transferred.

Power (P) is calculated as:

$$\text{power} = \text{work done} / \text{time taken} = \text{Energy transferred} / \text{time taken}$$

$$P = W / t \quad \text{or} \quad P = E / t$$

Where

- P = power (in watts, W)
- W = work done or energy transferred (in joules, J)
- t = time taken (in seconds, s)
- Power is a scalar quantity like work and energy. The SI unit of power is the Watt (W), where 1 Watt equals 1 Joule per second (1 W = 1 J/s).

Example: A motor does 500 Joules of work in 10 seconds. Calculate the power output of the motor.

given values:

- Work done, W=500 J
- Time taken, t=10 s

Required values: P=?

Solution: $P = W/t$

$$P = 500 \text{ J} / 10 \text{ s}$$

$$P = 50 \text{ W}$$

Result:

- The power output of the motor is 50 Watts (W).