

Power and Net Work

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Net Force and Work

Situation 1: A car idles on a level surface at a constant velocity. It is observed moving a distance of 32 m. How much work is done on the car?

Situation 2: You lift a 20 kg crate from the ground to a shelf 5 m high with a force of 215 N force. What is the velocity of the crate when it reaches the shelf?

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Power

- Definition
 - the rate at which work is done
- Equation (Linear)

$$P = \frac{\text{Work}}{t} = \frac{Fd}{t} = Fv$$

- Unit of Measure
 - Joule/second (J/s) or Watt (W)
- Conversion
 - 1 hp = 746 W

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Power

- Recall the different ways to solve for work and energy:
 - $W = Fd$
 - $W = \frac{1}{2} mv^2 - \frac{1}{2} mv_0^2$
 - $K = \frac{1}{2} mv^2$
 - $U_g = mgh$
 - $U_s = \frac{1}{2} k\Delta x^2$
- Any of these can be used in the top of the power equation.

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Power Sample Problem 1

- Adrienne lifts a 23 kg box on to a shelf that is 1.8 m above the floor. If it takes 1.4 s for her to move the box, how much power is generated?

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Power Sample Problem 2

- An electric motor lifts an elevator 9.00 m in 15.0s by exerting an upward force of 1.20×10^4 N. What is the power of the motor?

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