

Always draw the free body diagram first where forces are involved.

- A tourist exerts a 60 N force at an angle 40° above the horizontal as he drags his wheeled luggage (weight 130 N) a distance of 250 m at a constant speed on a level floor.
 - What work does he do on the luggage?
 - What work is done on the luggage by friction?
- A 1500 kg car accelerates uniformly from 0 to 100.0 km/h in 6.0 s on a level road.
 - What kind of energy has the fuel (chemical potential energy) been transformed into?
 - How much energy does the car have due to its motion?
- A tennis racket exerts an average force of 225 N on a 0.20 kg tennis ball over a distance of 15 cm.
 - How much work is done by the racket on the ball?
 - What is the speed of the ball just after it leaves the racket (assume the ball was stationary to start)?
- A chair lift takes skiers to the top of a mountain that is 320 m high. The average mass of a skier plus equipment is 85 kg. The lift can transport three skiers up the mountain every 35 s.
 - Determine the work done to lift three skiers to the mountain top.
 - What kind of energy has this work/energy transformation given the skiers?
 - Determine the power of the lift.
- A cross country skier skis at a constant speed on a level surface a total distance of 100 m in 45.0 s with the frictional force on the skis from the snow exerting an average force of 90 N.
 - What work did the skier do?
 - Because the skier did not speed up or slow down, how much work did friction do?
 - What was the skier's average power output?
- A car hoist lifts a 1100 kg car to a height of 2.1 m in 25 seconds.
 - How much work did the hoist do?
 - How much energy did the hoist give the car?
 - What power does the hoist develop?
- Workers exerts a constant force of 812 N to roll a 188 kg crate up a 5.6 m ramp sloped at 25° . The crate moves at constant speed up the ramp. Calculate:
 - The work done by the workers.
 - The energy the crate has been given when it gets to the top of the ramp.
 - Explain the difference between the answers in parts a) and b) above.

Answers:

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|---------------------------|------------------------|------------|---------------------------|-------------------------|---------------------------|-------------------------------|
| 1. a) 1.1×10^4 J | 2. a) kinetic E_K | 3. a) 34 J | 4. a) 8.0×10^5 J | 5. a) 9×10^3 J | 6. a) 2.3×10^6 J | 7. a) 4.5×10^3 J |
| b) -1.1×10^4 J | b) 5.5×10^5 J | b) 18 m/s | b) E_G | b) 9×10^3 J | b) 2.3×10^6 J | b) 4.4×10^3 J |
| | | | c) 23 kW | c) 200 W | c) 910 W | c) energy is lost to friction |