W6.07b

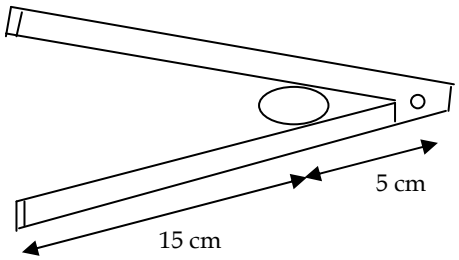
Energy

Simple Machines-Mechanical Advantage

-Solve Using Energy Methods-

1. Screw drivers act like a wheel and axle. Imagine that a screw has a radius of 0.28 centimeters. The handle of the screwdriver has a radius of 4.5 centimeters. Assume that the screwdriver is 100% efficient.
   a. If the screw needs 67 N worth of force applied to it in order to get it to turn, with how much force does the handle of the screwdriver need to be turned?
   b. What is the ideal mechanical advantage of this screwdriver?

2. A nutcracker acts like a lever, as shown above. The closed end of the nutcracker is the fulcrum.
   a. What is the ideal mechanical advantage of the nutcracker?
   b. Imagine that the nutcracker is only 92% efficient. What is the mechanical advantage of the nutcracker?
   c. With how much force must you squeeze the handles to crack a nut that requires 55 N to break?



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   a. 4.187 newtons [100% eff.---IMA = AMA = 16 : 1]

   b. IMA = 16 : 1 [100% eff.---IMA = AMA = 16 : 1]

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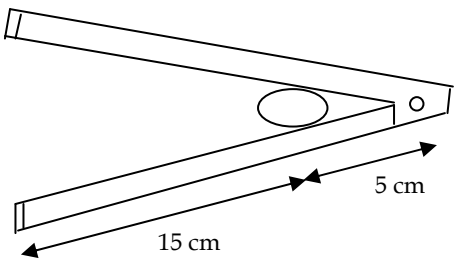

   a. IMA = 4 : 1 [20 cm / 5 cm]

   b. AMA = 3.68 : 1 [% eff.(IMA) = AMA so .92(4)]

   c. 14.94 newtons [AMA = F_{out} /F_{in}]