Work and Energy Worksheet

1. A force acts through a distance. Calculate the work.
2. A force at an angle moves an object through a distance. What is the work?
3. A horizontal force pulls a 20 kg box across the floor at constant speed. If the coefficient of friction is 0.6, what is the work required to move the box 3 m? (constant speed means forces are balanced, so Fa = Ff. Ff = µFN = µmg cos θ ) (be careful about the angle because if you lift the box normal force is reduced) (simplest case angle = 0)
4. How much work is done to lift an object of mass m a height h (F = mg so work = mgh) (leads to potential energy, can we get to kinetic energy from here?)
5. A block moves up a 30° incline under the action of certain forces, three of which are shown in Fig. 7.2, F1 is horizontal and of magnitude 40 N. F2 is normal to the plane and of magnitude 20 N. F3 is parallel to the plane and of magnitude 30 N. Determine the work done by each force as the block (and point of application of each force) moves 80 cm up the incline.
6. Work in a variety of directions (show that some work is negative, total work may add to zero).
7. Give a box an acceleration and calculate the work (Fa = ma + Ff, Ff = µmg cos θ) .
8. Work-Energy principle, if work = mgh and initial velocity = 0, show that work = ∆KE = mgh = ∆PE
9. Calculate KE given mass and velocity
10. What force is required to give an object a velocity after a distance d? (∆KE = Fd) (give mass, distance, and final velocity)
11. What distance does it take an object to stop given a coefficient of friction? (∆KE = Fd, give initial velocity and mass).
12. Work typical roller coaster problems where PE converts to KE and vice versa. (∆KE + ∆PE = 0)
13. Pendulum: what is the velocity at angle θ? (give r: length of string).





