Problems

18. A squirrel (m=1.5 kg) can climb a vertical wall of 10. m in 5.0 s.
    a) How much work does it do?
    b) How much power does it exert in watts?
    c) How much power in horsepower?

19. A truck exerts a force of 2000. N to pull a car (m=1000 kg) at a constant speed of 10. km/h over a level distance of 2.0 km.
    a) How much work does the truck do?
    b) How much work is done on the car?
    c) How much power in watts does the truck exert?

20. A racing car (m=800. kg) accelerates from rest so that it covers 0.40 km in 10.0 s. Calculate the power required in watts and horsepower.

21. A truck (m= 5000 kg) accelerates from rest to 20 m/s in 20 seconds. Assume the frictional forces are zero and calculate
    a) the work done on the truck.
    b) the power generated by the truck.
    c) the horsepower generated by the truck.

22. A golf ball (mass 100. g) travelling horizontally at 90. km/h strikes the side of a hill. If it penetrates a distance of 14 cm before it comes to rest, calculate:
    a) the work done on the ball as it slows down.
    b) the force exerted on the ball as it slows down.
    c) the power dissipated as the ball comes to rest.

23. A car (m=1200 kg) starts from rest and accelerates up a hill. After a time of 10.0 s, the car is travelling at a speed of 25 m/s. If the effective horsepower of the car is 80 hp, what is the vertical height of the car relative to its starting point? Ignore frictional effects.

24. A slab of rock (m = 2000. kg) starts from rest at the top of a hill and slides toward the bottom. As it slides down, it loses energy at a rate of 5.0 kW due to the friction. After it has slid for time X, it has dropped a vertical height of 10.0 m. At this time it is moving at 5.0 m/s. Calculate X.

25. A driver notices that her 1150-kg car slows down from 85 km/h to 65 km/h in about 6.0 s on the level when it is in neutral. Approximately what power (watts and hp) is needed to keep the car travelling at a constant 75 km /h?