

## ENERGY CONVERSION

1. A 75-watt light bulb is left on at your house over the weekend (48 hours). What volume of water must fall off the 40.0 m high dam to power of the light bulb? Assume 100% efficiency of a hydro power station, meaning that all of the potential energy of water is converted to electric energy.
2. The engine of a small aircraft produces 115 kW of power. How long would it take this aircraft to climb from seal level to the top of Mount Everest (height of 8 848 m) if the mass of the aircraft is about 1200 kg?

3. A 92kg Tarzan is holding onto a level 22 m vine. He swings on the vine. What will be his speed at the bottom of the swing?
4. A runaway truck with a mass of  $3.2 \times 10^4$  kg is travelling at 120 km/h when it starts up a runaway (escape) lane. How far up the lane will it get? (Measured as a vertical distance from the bottom of the runaway (escape) lane.)

5. A car of the future requires 15 kW of power to travel along a level road and 65 km/h. A physics student wishes to use the car to drive a distance of about 25 km. The engine is driven by heat energy recovered from special material which has a specific heat capacity of 9800 J/Kg°C. If the car has 350 kg of this material, the outside temperature is 15°C, and the engine is 88% efficient, to what temperature must the material be heated?

5. Some electric trolley busses use regenerative braking. When the bus puts its brakes on, the wheels are used to drive a generator, which supplies electric power to the overhead lines. If a bus has a mass of 8500 kg, and it is travelling at 75 km/h, how much power can be generated if the bus stops in 8 seconds?