a. Estimate how much chocolate would you need to eat to hike to the top of Rainier (4000 m).

Wangh =  $100 \text{kg} \times 10 \text{ms}^{-2} \times 9000 \text{m}$  2 4000 kJ  $\frac{W}{5} = 0.2$  : 2 4.5 W = 20 MJ:Mulce a 2 4.6 /2 mJ/100g = 1 kg

those

b. Estimate how much sweat you would produce in doing this. [The latent heat of vaporization of water is about 2000 kJ/kg]

$$\frac{Q}{W} = 4 : Q = 16000 kJ$$

$$\frac{16000 kJ}{2000 kJ/kg} = 8 kg ie 8 litres$$
evaporated  $\frac{2000 kJ/kg}{2000 kJ/kg}$ 

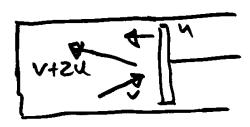
2. Bike pump. A sealed cylindrical pump contains one mole of an ideal gas. The piston fits tightly so that no gas escapes, but friction is negligible between the piston and the cylinder walls. The pump is thermally insulated from its surroundings. The piston is quickly pressed inward as indicated in the diagram.

a. What happens to the temperature of the gas, and why? [Hint: remember the first law of thermodynamics]

insulation

 $\Delta U = Q + W_{on} = \frac{3}{2} nR\Delta T$   $\int \int \int for ideal gas$  0 + ve > 0 -ve  $\therefore \Delta T > 0 (for any gas)$  = chally

**b.** How can you explain the temperature change using kinetic theory? [Hint: consider collisions of molecules with the moving piston]



each time a molecule hits the mound piston it connes off with a higher speed