Balancing the Energy *Budget*

Using the diagram, fill in the percentages for the energy budget (top of atmosphere, surface, lower atmosphere). Then answer the questions below.

Just like a family budget for finances, the energy budget of the Earth should be balanced. In equation form:

Energy In = Energy Out

This balance can be considered at several levels in the Earth system:

1. At the top of the atmosphere, the enegy coming in from the Sun is balanced by sunlight refelcted back to space and the net infrared emission from the Earth. The equation is:

Sunlight In = Sunlight reflected from clouds/atmosphere + Sunlight reflected from surface + IR emission
___100___= ___22.6____ + ___6.7____ + ___70.5____

2. At the *Earth's surface*, absorbed sunlight is balanced by the net IR emission and the conduction/convection and evapotranspiration. The equation is:

Sunlight absorbed + IR back radiation (greenhouse effect) = IR emission + Thermals + Evapotranspiration
___48____ + ___100____ = _117__ + __5.4__ + ___25.4____

3. The most complicated balance is in the *atmostphere* where absorbed sunlight and energy absorbed from the surface are balanced by the net infrared emission. The equation is:

Sunlight absorbed + IR absorbed + Thermals + Evapotranspiration = IR emitted to space + IR emitted to ground
___22.7____ + ___105.2___+ ___5.4____ + ___25.4____ = _49.9_ and _8.8_ + ___100____

4. Which layer(s), if any, don't balance?

a. Top of atmosphere **b. surface** c. lower atmosphere d. all are balanced

5. What happens if there is an imbalance?

_____The climate will work toward radiative equilibrium_____

Answer Key