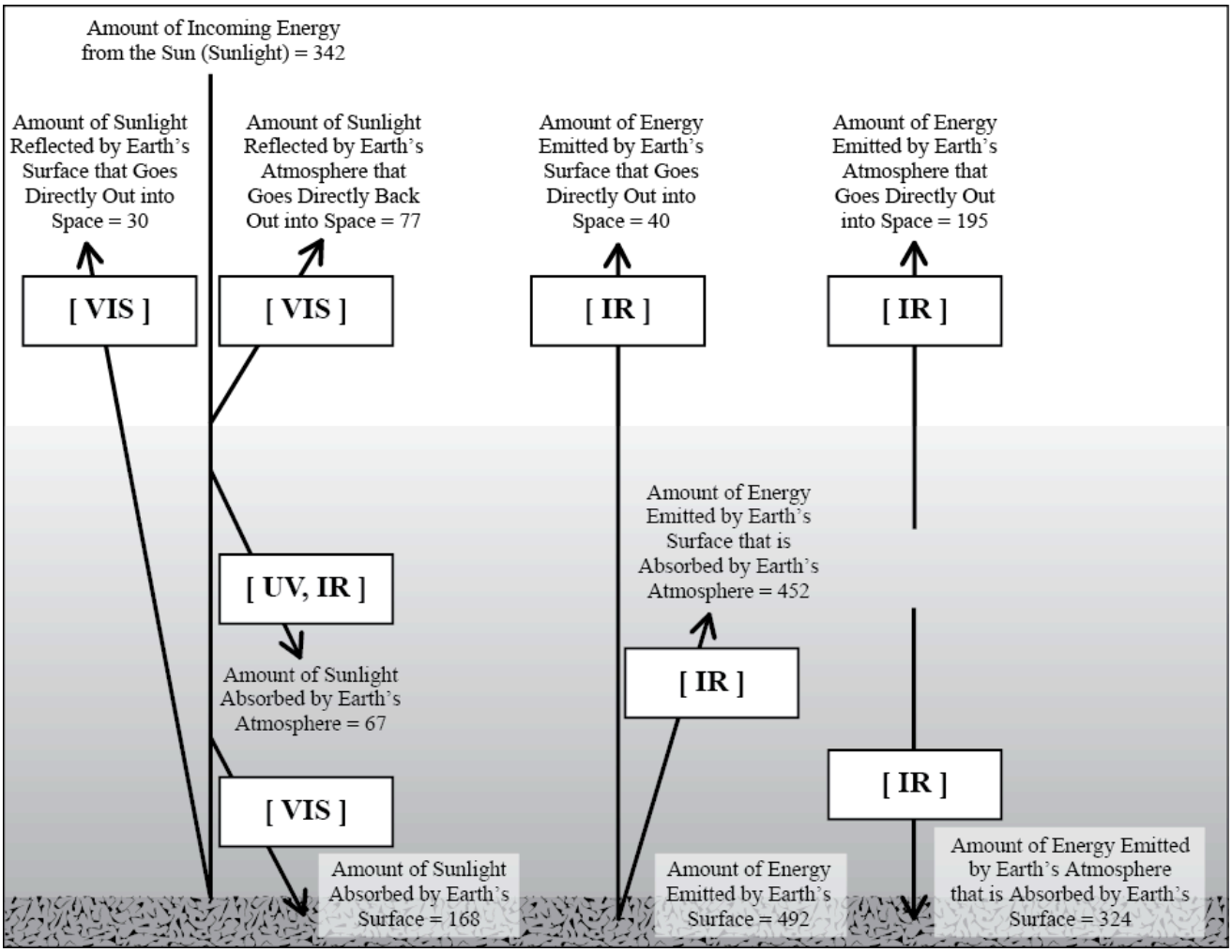
Answer keys to "Greenhouse Effect"

1. **[Majority of energy: visible (44%) & infrared (48%); Least amount of energy: ultraviolet (7%)]**
2. **[Student 2 is correct]** Though it is true that ultraviolet light is very energetic, if you look at the amount of energy given off by the Sun for each type of light, only 7% is ultraviolet, while 92% is visible and infrared.
3. **[Easier time getting through Earth's atmosphere: visible; Experiences more absorption: infrared]**
4. **[Easier time getting through Earth's atmosphere: infrared; Experiences more absorption: ultraviolet]**
5. **[Ultraviolet light is not an important energy source for heating the surface of Earth because very little light coming from the Sun in the first place is ultraviolet light (only 7%), and then Earth's atmosphere absorbs almost all of it.]**
6. **[Ultraviolet: O_2, O_3. Visible: none. Infrared: H_2O, CO_2.]**
7. **[H_2O, CO_2]**
8. **[Infrared]** Since the Sun has an energy distribution that peaks at visible wavelengths, and Earth's surface is much cooler than the Sun, Earth's surface must peak at wavelengths that are longer than visible (corresponding to cooler temperatures), which is infrared.
9. **[Yes: infrared]**
10. **[Student 2 is correct]** Student 1 confuses reflection and emission of light.
11. **[Absorbed by molecules in Earth's atmosphere]**
12. **[The total amount of energy coming from the Sun is equal to the total amount of energy leaving Earth to space.]** The amount of energy coming from the Sun = 342. The amount of energy leaving Earth to space = 30+77+40+195=342.
13. **[Light primarily heating Earth's surface: visible light from the Sun and infrared light from Earth's atmosphere; Light primarily heating Earth's atmosphere: infrared light from the Sun and infrared light from Earth's surface]**
14. **[More energy is absorbed by Earth's surface in the form of light coming from Earth's atmosphere]** The amount of energy absorbed by Earth's surface in the form of light coming from the Sun is 168, while the amount of energy absorbed by Earth's surface coming from light emitted by Earth's atmosphere is 324.

15. **[Warmer]**

16.



17. **[Student 2 is correct]**