1. For the food in the fridge to be cooled down, the internal energy of the food needs to **decrease**. The food needs to **lose** heat. Heat needs to flow from the **inside** of the fridge to the **outside** of the fridge.

2. The refrigerant circulates in the pipe system of the refrigerator. The purpose of the refrigerant is to carry heat from the **inside** of the fridge to the **outside** of the fridge. While the refrigerant vaporizes, it **absorbs** heat, and while it condenses it **releases** heat.

3. a) The condenser feels **warm**.
   While condensating the refrigerant **releases** heat, that's why the condenser is located **outside** the fridge.
   b) The evaporator feels **cold**.
   While vaporizating the refrigerant **absorbs** heat, that's why the evaporator is located **inside** the fridge.

4. At higher external pressure, the boiling point will be **higher**. This means, that at the same temperature, a substance can be gaseous at **low** pressure and liquid at **high** pressure.

5. Increasing the pressure makes it condense, decreasing the pressure makes it vaporize.

6. At „normal" pressure and room temperature the refrigerant needs to be **gaseous** and at higher pressure it needs to be **liquid**.
   A good choice would be: ammonia (ϑ_V = – 33.4 °C), chlorine (ϑ_V = – 34.1 °C), isobutane (ϑ_V = – 11.7 °C), propane (ϑ_V = – 42 °C). The boiling point of these substances is below room temperature but not too low.

7. The compressor increases the pressure. The refrigerant becomes liquid and releases heat.

8. The expansion valve reduces the pressure. The refrigerant becomes gaseous and absorbs heat.

9. a) ①: condensor, ②: evaporator, ③: expansion valve, ④: compressor

   b) High pressure: condensor (①); low pressure: evaporator (②).

   c) High boiling point: condensor (①); low boiling point: evaporator (②).

   d) In the condensor (①) the refrigerant becomes liquid, in the evaporator (②) the refrigerant becomes gaseous.

10. Because it releases heat. If the heat were released inside the fridge, the temperature in the fridge would increase.

11. No, because the refrigerator releases heat at the back. The heat which is absorbed inside the fridge is released outside the fridge. It actually heats the kitchen while it cools the food down.

12. Spontaneously, heat always flows from an object of **higher** temperature to an object of **lower** temperature. For heat to flow in the opposite direction, work needs to be done. In a fridge, **electrical** energy is required to operate the **compressor**.