This is part of a CLASS SET – DO NOT WRITE ON ME – DO NOT TAKE ME HOME

**Complete and Incomplete Proteins**

**Complete proteins are foods that contain all of the 9 essential amino acids that make up your proteins.** There are at least 20 amino acids, but the 9 considered essential for daily human consumption are *histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine***.** Complete protein foods, or a sufficient combination of incomplete proteins, must be consumed daily. The body needs to take in the essential amino acids for healthy functioning each day, but cannot produce them naturally. The other amino acids, which are still required to make all of the different kinds of proteins your cells need to survive, can be made in your cells by chemical reactions with other molecules.   
  
\***Meat, including fish and poultry** are complete animal proteins. Vegetarians and vegans don’t eat these.  
\***Eggs and dairy (like cheese and milk)** are animal products that are complete proteins. Vegans don’t eat these.  
\*Examples of plant-based complete protein sources are **soybeans, buckwheat, and quinoa.**  
  
The body absorbs animal-based proteins much easier than plant sources, so vegetarians must be especially careful to consume enough complete protein sources. The essential amino acids lysine and tryptophan are found mostly in animal proteins; however, soybeans are a vegetable protein choice that contains all of the essential amino acids. Soy can be used to make tofu, soy milk, and even as a meat substitute (fake, imitation meat)!

**While a complete protein has all nine amino acids, an incomplete source either has insufficient amounts of them or is missing one or more**. Foods that don’t provide all essential amino acids are **fruits, vegetables, nuts, seeds, legumes (beans), potatoes, and grains (rice, oats, wheat, corn**).

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| Eating nutritiously by combining incomplete proteins need not be difficult.**Incomplete proteins don’t even have to be consumed at the same meal, as long as they’re eaten each day.**The body will still digest them together on a short term basis.  There are many different possible mixtures of incomplete proteins that form a complete protein source. On the diagram to the right, combining food groups **along the sides of the square** (not across the middle) will provide all of the essential amino acids.  For example, the**wheat in bread (grains) combined with peanut butter (nuts) creates a complete protein.** | **http://24.media.tumblr.com/b6447524329d9c1f1e0893b59f196aa4/tumblr_mnupxfMA4p1qkwz6no1_250.jpg** |

Getting enough complete proteins throughout the day isn’t difficult as long as a balanced, nutritious diet is consumed. It’s important to note that an excess of protein isn’t needed and may do more harm than good. Eating the recommended amount of protein along with other essential foods each day in a balanced diet should be the focus.

**Add these answers to your notes:**

1. Define “complete” proteins, and list what food sources have them.
2. Define “incomplete” proteins, and list what food sources have them.
3. Copy the diagram above and then, **along the sides** of the square, name a common food or meal for each of the 4 combinations of incomplete proteins that, when eaten together, are complete proteins
4. Describe at least 5 example **functions** of proteins (choose your favorite 5 from bio textbookpages: 55, 73, 84, 139, 144, 145, 236, 240, 248, 915, 927, 947, 1008, 1013)