

## Amino Acid Sequences – Finding Similarities Worksheet

Name \_\_\_\_\_

### Instructions:

The following Data Table 1 shows the amino acids found in selected sites in hemoglobin of different vertebrates. Examine the chart for differences between humans and other organisms.

1. Count the numbers of molecules of each amino acid in human hemoglobin. Record these totals in the appropriate column of Data Table 2.
2. Count the number of molecules of each amino acid of other vertebrates' hemoglobin. Record these totals in the appropriate columns of Data Table 2.
3. Going from left to right, note the position of each amino acid. Count the number of similarities in the amino acid positions in human hemoglobin as compared with the hemoglobin of the other vertebrates in Data Table 1. Record your observations in Data Table 3.
4. Reexamine Data Table 1 and count the numbers of differences in the amino acid positions in human hemoglobin as compared with the hemoglobin of the other vertebrates in Data Table 1. Record observations in Data Table 3.

**Data Table 1: Selected Amino Acid Positions in the Hemoglobin of some vertebrates**

<b>Human</b>	<b>V</b>	<b>K</b>	<b>A</b>	<b>H</b>	<b>G</b>	<b>K</b>	<b>K</b>	<b>V</b>	<b>L</b>	<b>G</b>	<b>A</b>	<b>F</b>	<b>S</b>	<b>D</b>	<b>G</b>	<b>L</b>	<b>A</b>	<b>H</b>	<b>L</b>	<b>D</b>
<b>Chimpanzee</b>	<b>V</b>	<b>K</b>	<b>A</b>	<b>H</b>	<b>G</b>	<b>K</b>	<b>K</b>	<b>V</b>	<b>L</b>	<b>G</b>	<b>A</b>	<b>F</b>	<b>S</b>	<b>D</b>	<b>G</b>	<b>L</b>	<b>A</b>	<b>H</b>	<b>L</b>	<b>D</b>
<b>Gorilla</b>	<b>V</b>	<b>K</b>	<b>A</b>	<b>H</b>	<b>G</b>	<b>K</b>	<b>K</b>	<b>V</b>	<b>L</b>	<b>G</b>	<b>A</b>	<b>F</b>	<b>S</b>	<b>D</b>	<b>G</b>	<b>L</b>	<b>A</b>	<b>H</b>	<b>L</b>	<b>D</b>
<b>Baboon</b>	<b>V</b>	<b>K</b>	<b>A</b>	<b>H</b>	<b>G</b>	<b>K</b>	<b>K</b>	<b>V</b>	<b>L</b>	<b>G</b>	<b>A</b>	<b>F</b>	<b>S</b>	<b>D</b>	<b>G</b>	<b>L</b>	<b>N</b>	<b>H</b>	<b>L</b>	<b>D</b>
<b>Lemur</b>	<b>V</b>	<b>K</b>	<b>A</b>	<b>H</b>	<b>G</b>	<b>K</b>	<b>K</b>	<b>V</b>	<b>L</b>	<b>T</b>	<b>A</b>	<b>F</b>	<b>S</b>	<b>E</b>	<b>G</b>	<b>L</b>	<b>H</b>	<b>H</b>	<b>L</b>	<b>D</b>
<b>Dog</b>	<b>V</b>	<b>K</b>	<b>A</b>	<b>H</b>	<b>G</b>	<b>K</b>	<b>K</b>	<b>V</b>	<b>L</b>	<b>N</b>	<b>S</b>	<b>F</b>	<b>S</b>	<b>D</b>	<b>G</b>	<b>L</b>	<b>K</b>	<b>N</b>	<b>L</b>	<b>D</b>
<b>Chicken</b>	<b>V</b>	<b>R</b>	<b>A</b>	<b>H</b>	<b>G</b>	<b>K</b>	<b>K</b>	<b>V</b>	<b>L</b>	<b>T</b>	<b>S</b>	<b>F</b>	<b>G</b>	<b>D</b>	<b>A</b>	<b>V</b>	<b>K</b>	<b>N</b>	<b>L</b>	<b>D</b>
<b>Frog</b>	<b>V</b>	<b>L</b>	<b>A</b>	<b>H</b>	<b>G</b>	<b>E</b>	<b>K</b>	<b>V</b>	<b>L</b>	<b>A</b>	<b>A</b>	<b>I</b>	<b>G</b>	<b>E</b>	<b>G</b>	<b>L</b>	<b>K</b>	<b>H</b>	<b>P</b>	<b>E</b>

**Data Table 2**

Amino Acid	Abb.	Human	Chimpanzee	Gorilla	Baboon	Lemur	Dog	Chicken	Frog
Alanine	A								
Argenine	R								
Asparagine	N								
Aspartic acid	D								
Cysteine	C								
Glutamic acid	E								
Glutamine	Q								
Glycine	G								
Histadine	H								
Isoleucine	I								
Leucine	L								
Lysine	K								
Methionine	M								
Phenylalanine	F								
Proline	P								
Serine	S								
Threonine	T								
Tryptophan	W								
Tyrosine	Y								
Valine	V								

**Data Table 3**

Organism		Number of Similar Amino Acid Positions Complete Conservation or Matching Semi-Conserved Areas	Number of Different Amino Acid Positions Non-Conserved Areas
<b>Human vs.</b>	<b>Chimpanzee</b>		
	<b>Mt. Gorilla</b>		
	<b>Olive Baboon</b>		
	<b>Lemur</b>		
	<b>Dog</b>		
	<b>Chicken</b>		
	<b>Frog</b>		

**Questions:**

1. Which primate is most closely related to the human being?
2. Which non-primate is most closely related to the human being?

