Screening Hemoglobin for Sickle Cell Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sickle cell anemia only develops in individuals who have two copies of the sickle cell allele (homozygous). Heterozygotes have some sickled cells and some regular red blood cells.

Analysis:

1. Create a sketch of the gel results in the space below.   
 Circle the genotype of individuals whose red blood cells are likely have any sickling.

Phenotype Label each person’s **genotype**. N = normal, n = sickle cell

Normal \_\_\_\_\_\_\_

Carrier \_\_\_\_\_\_\_

Sickle disease \_\_\_\_\_\_\_

2. Your text identifies sickle cell as a recessive disorder with heterozygotes being normal. Other texts identify the heterozygote as co-dominant. Which do you think is a better description of the sickle cell allele…recessive or co-dominant? Explain your reasoning.

3. Judging by the results of the gels, which patient(s) would need to begin treatment for sickle cell   
 anemia? Why?

4. What do the bands represent…cells or alleles?

5. Explain why Patient 2 displays two bands and Patients 1 and 3 have only one band?

6. What properties of the proteins used in this activity are critical to the detection by agarose gel   
 electrophoresis? Why?

7. Explain how sickle cell anemia or carrying a sickle cell allele would provide a selective advantage for   
 residents of Africa but not for residents of Canada.

8. Sickle cell anemia only develops in individuals who have two copies of the sickle cell allele   
 (homozygous). Carriers (heterozygotes) have some sickled cells and some regular red blood cells.   
 Provide an answer for each of the following.

a. What are the chances that two people, both heterozygous for the sickle cell allele, will have a child that is also heterozygous for the sickle cell allele? \_\_\_\_\_\_\_\_ What is the chance of a child with sickle cell anemia? \_\_\_\_\_\_\_\_ Show the Punnett square below:

b. What are the chances that two people, one heterozygous and one homozygous for the sickle cell allele, will have a child that is heterozygous for the sickle cell allele? \_\_\_\_\_\_\_\_ What is the chance of a child with sickle cell anemia? \_\_\_\_\_\_\_\_ Show the Punnett square below: