The Respiratory System: Gas Transport

1. Oxygen transport in the blood:
   _____% is bound to hemoglobin
   _____% dissolves in plasma

2. The hemoglobin molecule is composed of ___ polypeptide chains and ___ heme groups containing iron.
   What does oxygen bind to? _________

3. After one oxygen molecule (O₂) binds to hemoglobin, it is easier for the other molecules to bind to the hemoglobin.
   This is known as ____________________.

4. When oxygen is loaded onto hemoglobin in the lungs, hemoglobin is called ________________, and when oxygen is unloaded from the hemoglobin at the tissues it is called ____________________.

5. From the oxygen-hemoglobin dissociation curve, we see the following:
   Lungs: Partial pressure of oxygen is ____ mmHg
   Hemoglobin is ____% saturated
   Tissues: Partial pressure of oxygen is ___ mmHg
   Hemoglobin is ____% saturated

6. Effect of high altitude on lung PO₂:
   With a decrease of 20 mmHg in the lungs, will the saturation of hemoglobin decrease significantly? _______

7. Effect of exercise on tissue PO₂:
   With a decrease of 20 mmHg in the tissues, will the saturation of hemoglobin decrease significantly? _____.
   How does this help the tissues? ________________________________.

8. Name the other factors that alter PO₂:
   During exercise, would an increase (↑) or decrease (↓) in these factors decrease PO₂ hemoglobin saturation, making more O₂ available to the tissues?
These factors would shift the oxygen-hemoglobin curve to the ________.

9. List the percentages for CO₂ transport in the blood:
   ____% dissolved in plasma
   ____% combined with hemoglobin
   ____% converted to bicarbonate ions

   When CO₂ binds to hemoglobin, it is called ________________.

10. CO₂ transport as bicarbonate ions:

   CO₂ binds with water to form ________ acid.

   The catalyst for this reaction is __________ ________.

   The acid mentioned above then dissociates into ________ ions and ________ ions.

   When bicarbonate ions move out of the red blood cell, ________ ions move in.

   This is known as the ________ shift.

   The reaction occurs in the opposite direction at the lungs so that CO₂ can be released.

11. A decrease in hemoglobin O₂ leads to an increase in CO₂ loading. Said another way, O₂ loading
    facilitates CO₂ unloading. (Note: The effect is on CO₂ loading and unloading.)

    This is known as the ____________ effect.

12. A decrease in CO₂ loading facilitates __________ unloading from hemoglobin. Said another way, CO₂
    loading facilitates O₂ unloading. (Note: The effect is on O₂ loading and unloading.)

    This is known as the ____________ effect.