WKS
Real Gases

NAME Answer Key
Period _____ **Date** _____

Re-read pp. 435-436, "Real versus ideal gases" and answer the following questions.

1. Gases deviate from ideal behavior when the pressure is **(very low, very high)**. Explain why in terms of Kinetic Molecular Theory (KMT). Your answer should include references to TWO assumptions of KMT that are no longer valid under your selected condition of pressure.
   At very high pressures, the particles are very close together, so the volume and shape of each particle are no longer negligible, preventing other particles from occupying a significant volume of the container. Also, as the particles collide, the attractive forces and shapes of the particles act to slow them down. At high enough pressures, gases can liquefy.

2. Gases deviate from ideal behavior when the temperature is **(very low, very high)**. Explain why in terms of KMT. What happens to the particles under your selected condition?
   At very low temperatures, the average speed of the particles goes down, so their kinetic energy is no longer large compared to the strength of the attractive forces. Eventually the temperature goes low enough that the attractive forces become significant and the gas liquefies and eventually solidifies.

3. Given your answers to 1 & 2, what are the conditions of pressure and temperature under which a gas will behave most ideally? Explain why in terms of KMT.
   A gas behaves most ideally at LOW PRESSURE and HIGH TEMPERATURE. At low pressure, the volume and shape of each particle becomes negligible because the distances between particles are large, while at high temperature the particles have enough kinetic energy to overcome the weak attractive forces between them.

4. Which of the following gases would you expect to behave most like an ideal gas at room temperature and atmospheric pressure: water vapor, carbon dioxide, helium, or hydrogen? Explain in terms of size, shape & polarity of each particle.
   Helium is most ideal because it is the smallest, most spherical, and has the weakest forces of attraction. Hydrogen is larger and non-spherical, as is carbon dioxide, and water is larger, non-spherical and very polar.

For each statement below, write *true* or *false*. If it is false, change the statement to make it true.

False 5. An ~~ideal~~ real gas is one whose particles take up space.

False 6. At low temperatures, ~~ideal~~ real gases liquefy.

True 7. In the real world, gases consisting of small molecules are the only gases that are truly ideal.

True 8. Most gases behave like ideal gases at many temperatures and pressures.

False 9. No intermolecular attractive forces exist in ~~a~~ an ideal gas.

True 10. Nonpolar gas molecules behave more like ideal gases than do gas molecules that are polar.

True 11. Real gases deviate most from ideal gas behavior at high pressures and low temperatures.

True 12. The smaller the gas molecule, the more the gas behaves like an ideal gas.