1. Compare the maximum speeds at which a car can safely negotiate an unbanked turn (radius = 50.0 m) in dry weather (coefficient of static friction = 0.900) and icy weather (coefficient of static friction = 0.100).

2. A 1.10×10^3-kg car, starting from rest, accelerates for 5.00 s. The magnitude of the acceleration is $a = 4.60$ m/s^2. Determine the average power generated by the net force that accelerates the vehicle.

3. In a half hour, a 65-kg jogger can generate 8.0×10^5 J of heat. This heat is removed from the jogger's body by a variety of means, including the body's own temperature-regulating mechanisms. If the heat were not removed, how much would the body temperature increase?

4. In the lungs, the respiratory membrane separates tiny sacs of air (absolute pressure = 1.00×10^5 Pa) from the blood in the capillaries. There sacs are called alveoli, and it is from them that oxygen enters the blood. The average radius of the alveoli is 0.125 mm, and the air inside contains 14 % oxygen. Assuming that the air behaves as an ideal gas at body temperature (310 K), find the number of oxygen molecules in one of the sacs.

5. Water near the surface of a tropical ocean has a temperature of 298.2 K (25.0 ℃), whereas water 700 m beneath the surface has a temperature of 280.2 K (7.0 ℃). It has been proposed that the warm water be used as the hot reservoir and the cool water as the cold reservoir of a heat engine. Find the maximum possible efficiency for such an engine.

6. Determine the number of particles, each carrying a charge of 1.60×10^{-19} C (the magnitude of the charge on an electron), that pass between the terminals of a 12-V car battery when a 60.0-W headlight burns for one hour.

7. Use Ampere's law to obtain the magnetic field produced by the current in an infinitely long, straight wire.

8. Find the range in wavelengths (in vacuum) for visible light in the frequency range between 4.0×10^{14} Hz (red light) and 7.9×10^{14} Hz (violet light). Express the answers in nanometers.

9. Determine the number of possible states for the hydrogen atom when the principal quantum number is (a) $n = 1$ and (b) $n = 2$.

10. Strictly speaking, the Bohr model does not apply to multiple-electron atoms, but it can be used to make estimates. Use the Bohr model to estimate the minimum energy that an incoming electron must have to knock a K-shell electron entirely out of an atom in a platinum ($Z = 78$) target in an X-ray tube.

10 points for each question and some useful constants:

a.

Substance	Specific Heat Capacity, c J/(kg·℃)
Ice (-15 ℃)	2.00×10^3
Human body (37 ℃, average)	3500
Water (15 ℃)	4186

b. $k = 1.38 \times 10^{-23}$ J/K

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