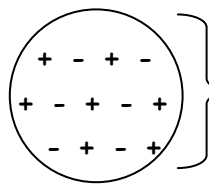


Name: _____ Period: _____ Date: _____

Ms. Randall Regents Chemistry

200 Ways to Pass the Chemistry Physical Setting Regents Exam

1. _____ are positively charged (+).
2. _____ have no charge.
3. _____ are small and are negatively charged (-).
4. Protons & neutrons are in an atom's nucleus and are called _____
5. Electrons are found in "clouds" or _____ around an atom's nucleus.
6. The _____ is equal to an atom's number of protons and neutrons added together.
7. The _____ is equal to the number of protons in the nucleus of an atom.
8. The _____ *of* _____ = mass number - atomic number.
9. _____ are atoms with equal numbers of protons, but differ in their neutron numbers.
10. _____ are *positive* (+) ions and form when a neutral atom *loses* electrons. They are *smaller* than their parent atom.
11. _____ are *negative* ions and form when a neutral atom *gains* electrons. They are *larger* than their parent atom.
12. _____ *gold foil experiment* showed that an atom is mostly empty space with a small, dense, positively-charged nucleus.
13. _____ discovered the electron and developed the "plum-pudding" model of the atom.



Positive & negative particles spread throughout entire atom.

14. _____ *model* of the atom was a solid sphere of matter that was uniform throughout.
15. The _____ *model* of the atom placed electrons in "planet-like" orbits around the nucleus of an atom.
16. The current, _____ - _____ *model* of the atom has electrons in "clouds" (orbitals) around the nucleus.
17. USE THE REFERENCE TABLE!!!
18. _____ means "**S**tandard **T**emperature and **P**ressure." (273 Kelvin & 1 atm)
19. Electrons emit energy as light when they jump from higher energy levels back down to lower (_____ _____) energy levels. _____ *spectra* are produced.
20. _____ are pure substances composed of only one kind of atom.
21. _____ *compounds* are substances made up of only *two* kinds of atoms.
(examples: H_2O , NH_3 , CO_2)
22. _____ *molecules* are elements that form two atom molecules in their natural form at STP. Remember the phrase - "HOFBrINCl" (H_2 , O_2 , F_2 , Br_2 , I_2 , N_2 , Cl_2)
23. Use this diagram to help determine the *number of* _____ *figures* in a measured value...

Pacific



Atlantic

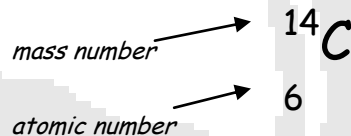
If the decimal point is *present*, start counting digits from the *Pacific* (left) side, starting with the first non-zero digit.

→ 1 2 3
0.00310 (3 sig. figs.)

If the decimal point is absent, start counting digits from the Atlantic (right) side, starting with the first non-zero digit.

3 2 1 ←
31,400 (3 sig. figs.)

24. _____ are the best examples of _____ *mixtures*. (Air, salt water, etc.)
25. _____ *mixtures* have discernable components and *are not* uniform throughout. (Chocolate-chip cookies, vegetable soup, soil, muddy water, etc.)
26. A _____ is the substance being dissolved, while the _____ is the substance that dissolves the solute. (Water is the solvent in Kool-Aid, while sugar is the solute.)
27. Isotopes are written in a number of ways: C-14 is also Carbon-14, and is also



28. The distribution of electrons in an atom is its *electron* _____.
29. Electron configurations are written in the bottom center of an element's box on the periodic table in your reference tables.

24.305
Mg
12 2-8-2

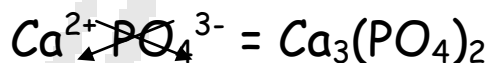
↑ # of electrons in 3rd principal energy level
↑ # of electrons in 2nd principal energy level
↑ # of electrons in 1st principal energy level

30. Use the mole formula on Table ____ or the mole hole to solve mole-mass problems.
31. USE THE REFERENCE TABLE!!!
32. Polyatomic ions (Table E) are groups of atoms with an overall charge.
 NO_3^{1-} , NH_4^{1+} , SO_4^{2-} , etc.

33. _____ are written in front of the formulas of reactants and products in chemical equations. They give us the ratios of reactants and products in a balanced chemical equation.

34. Chemical formulas are written so that the charges of cations and anions neutralize one another. "Criss-Cross"

Example: *calcium phosphate*:



35. When naming binary ionic compounds, write the name of the positive ion (cation) first, followed by the name of the negative ion (anion) with the name ending in "-ide." Example:



36. When naming compounds containing polyatomic ions, keep the name of the polyatomic ion the same as it is written in Table E.

Example:



37. _____ **changes** do not form new substances. They merely change the appearance of the original material. (The melting of ice)

38. _____ **changes** result in the formation of new substances.
(The burning of hydrogen gas to produce water vapor)

39. _____ are on the left side of the reaction arrow and _____ are on the right.

40. _____ **reactions** absorb heat. The energy value *is on the left (reactant) side* of the reaction arrow in a forward reaction.

41. _____ **reactions** release energy and the *energy is a product* in the reaction.

42. *Only* _____ can be changed when balancing chemical equations!

43. _____ **reactions** occur when two or more reactants combine to form a single product. Example: $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$

44. _____ **reactions** occur when a single reactant forms two or more products. *Example:* $\text{CaCO}_{3(s)} \rightarrow \text{CaO}_{(s)} + \text{CO}_{2(g)}$

45. _____ reactions occur when one element replaces another element in a compound.



46. _____ **reactions** occur when two compounds react to form two new compounds. *Example:* $\text{AgNO}_3 + \text{KCl} \rightarrow \text{AgCl} + \text{KNO}_3$

47. The masses of the reactants in a chemical equation is always equal to the masses of the products. "**Law of Conservation of** _____."

48. The gram formula mass of a substance is the sum of the atomic masses of all of the atoms in it. $\text{H}_2\text{SO}_4 = 98 \text{ g/mole}$

$$\begin{array}{l} 2 \times \text{H} = 2 \times 1 \text{ g/mole} = 2 \text{ g/mole} \\ 1 \times \text{S} = 1 \times 32 \text{ g/mole} = 32 \text{ g/mole} \\ 4 \times \text{O} = 4 \times 16 \text{ g/mole} = 64 \text{ g/mole} \end{array} \left. \vphantom{\begin{array}{l} 2 \times \text{H} \\ 1 \times \text{S} \\ 4 \times \text{O} \end{array}} \right\} \text{sum} = 98 \text{ g/mole}$$

49. Know how to calculate the percentage composition of a compound. (Formula is on Table ____.)

50. USE THE REFERENCE TABLE!!

51. The particles in a _____ are rigidly held together.

52. _____ have a definite shape and volume.

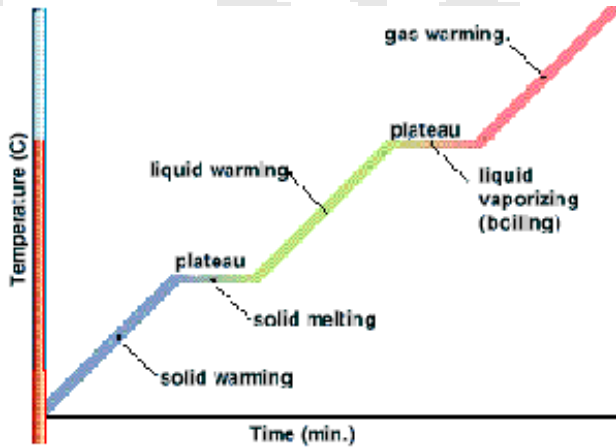
53. _____ have closely-spaced particles that easily slide past one another.

54. _____ have no definite shape, but have a definite volume.

55. _____ have widely-spaced particles that are in random motion.

56. _____ are easily compressed and have no definite shape or volume.

57. Be able to read and interpret heating/cooling curves as pictured below.



58. Substances that _____ turn from a solid directly into a gas. (CO_2 & I_2)

59. Degrees Kelvin = $^{\circ}\text{C}$ + _____

60. Use this formula to calculate heat absorbed/released by substances.

$$q = mc\Delta T$$

q = heat absorbed or released (Joules)

m = mass of substance in grams

c = specific heat capacity of substance ($\text{J/g}\cdot^{\circ}\text{C}$) ... for water it's 4.18

ΔT = temperature change in degrees Celsius

61. The heat absorbed or released when 1 gram of a substance changes between the solid and liquid phases is the substance's *heat of* _____. (334 J/g for water)

62. The heat absorbed or released when 1 gram of a substance changes between the liquid and gaseous phases is the substance's *heat of* _____. (2260 J/g for water)

63. As the _____ on a gas increases, _____ decreases proportionally.

64. As the _____ on a gas increases, _____ increases.

65. As the _____ of a gas increases, _____ increases.

66. Always use Kelvins for temperature when using the *combined* _____ law.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

67. _____ **gas** particles have volume and are attracted to one another, and thus do not always behave like _____ **gases**.

68. Real gases behave more like ideal gases at *low pressures and high temperatures*.

69. _____ separates mixtures with different boiling points.

70. _____ separates mixtures of solids and liquids.

71. _____ can also be used to separate mixtures of liquids and mixtures of gases.

72. **The** _____ **Law** states that the properties of elements are periodic functions of their *atomic numbers*.

73. _____ are horizontal rows on the Periodic Table.

74. _____ are vertical columns on the Periodic Table.

75. _____ are found left of the "staircase" on the Periodic Table, _____ are above it, and _____ border it.

76. Memorize this chart.

Metals	Malleable	Ductile	Lustrous	Good conductors of heat & electricity	Low ionization energy and electroneg.	Tend to form + ions
Nonmetals	Brittle when solid	Mostly gases at STP	Dull	Good insulators	High ionization energy and electroneg.	Tend to form - ions

77. _____ (Group 18) are inert and stable due to the fact that their valence level of electrons is completely filled.

78. _____ **energy** increases as you go up and to the right on the Periodic Table.

79. _____ *decrease* left to right across a period due to increasing nuclear charge.

80. _____ **radii** increase as you go down a group.

81. _____ is a measure of an element's attraction for electrons.

82. Electronegativity _____ as you go up and to the right on the Periodic Table.
83. The elements in Group 1 are the _____.
84. The elements in Group 2 are the _____.
85. The elements in Group 17 are the _____.
86. The elements in Group 18 are the _____.
87. Use **Table** ____ to compare and look up the properties of specific elements.
88. Energy is **released** when a chemical bond _____. The more energy that is released, the more stable the bond is.
89. The last digit of an element's group number is equal to its **number of** _____.
90. Draw one dot for each valence electron when drawing an element's or ion's _____ **diagram**.
91. The **kernel** of an atom includes everything in an atom *except* the atom's valence electrons.
92. Metallic bonds can be thought of as a crystalline lattice of kernels surrounded by a "sea" of mobile valence electrons.
93. Atoms are most stable when they have 8 valence electrons (an _____) and tend to form ions to obtain such a configuration of electrons.
94. _____ **bonds** form when two atoms **share** a pair of electrons.
95. _____ **bonds** form when one atom **transfers** an electron to another atom when forming a bond with it.
96. _____ **covalent bonds** form when two atoms of the *same element* bond together or when the electronegativity difference between two atoms is zero.
97. _____ **covalent bonds** form when the electronegativity difference between two bonding atoms is between 0.5 and 1.6.

98. _____ **bonds** form when the electronegativity difference between two bonding atoms is *1.7 or more*.

99. Substances containing mostly covalent bonds are called _____ **substances**.

100. Substances containing mostly ionic bonds are called _____ **compounds**.

101. Memorize this table.

Substance Type	Properties
_____	Hard High melting and boiling points Conduct electricity when molten or when aqueous
_____ (Molecular)	Soft Low melting and boiling points Do not conduct electricity (insulators)

102. _____ **bonds** form when hydrogen bonds to the elements N, O, or F and gives the compound unusually high melting and boiling points.

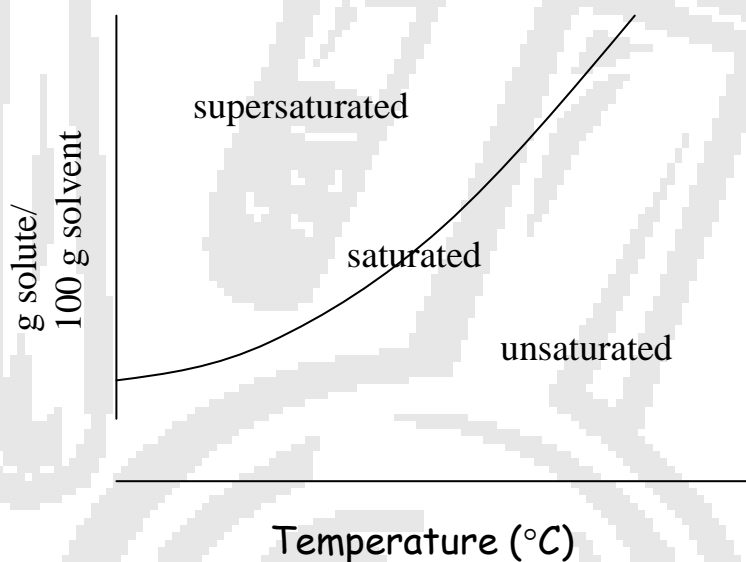
103. Use **Table** _____ to predict the solubilities of compounds.

104. Remember substances tend to be soluble in solvents with similar properties....
"Like dissolves _____"

105. As temperature increases, solubility _____ for most solids.

106. At low temperatures and high pressures solubility _____ for most gases.

107. Use Table _____ to determine whether a solution is *saturated*, *unsaturated*, or *supersaturated*.



108. _____ is a way to measure the *concentration* of a solution. Molarity is equal to the number of moles of solute divided by the number of liters of solution. The formula is on the back of the reference tables.

109. _____ *by* _____ = mass of the part / mass of the whole \times 100%

110. _____ *per* _____ (*ppm*) = grams of solute / grams of solution \times 1,000,000

111. Solutes _____ the boiling points and _____ the melting points of solvents.

112. Liquids _____ when their vapor pressure is equal to the atmospheric pressure.

113. The *normal boiling point* of a substance is the temperature at which it boils at 1 atm (101.3kPa) of pressure. (Take note of Table H)

114. Covalently bonded substances tend to react more slowly than ionic compounds.

115. Increasing the concentration of reactants will _____ reaction rate.

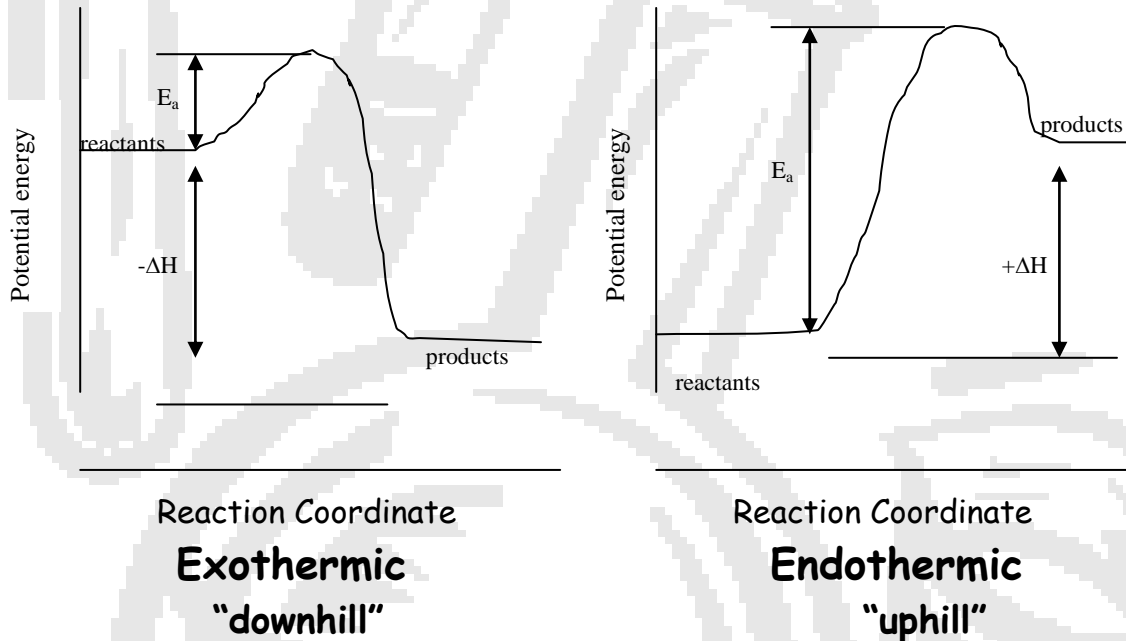
116. Increasing the surface areas of the reactants will _____ reaction rate.

117. Increasing the pressure on gases _____ reaction rate.

118. _____ speed up reactions by lowering their *activation energies*. They are not changed themselves and can be reused many times over.

119. Increasing temperature _____ reaction rate.

120. Be able to recognize and read *potential energy diagrams*.



121. ΔH is (+) for _____ reactions and is (-) for _____ reactions.

122. The rates of the forward and reverse reactions are equal at equilibrium.

123. _____ any reactant or product to a system at equilibrium will shift the equilibrium away from the added substance.

124. _____ any reactant or product from a system at equilibrium will shift the equilibrium point toward that removed substance.

125. An _____ *in temperature* shifts an equilibrium system in the *endothermic direction*. (Move away from the heat)

126. A _____ *in temperature* shifts an equilibrium system in the *exothermic direction*. (Move toward the heat)

127. _____ *the pressure* on a gaseous equilibrium will shift the equilibrium point toward the side with *fewer moles of gas*. (Because the volume was decreased)

128. _____ *the pressure* on a gaseous equilibrium will shift the equilibrium point toward the side with *more moles of gas*.

129. *Catalysts* have _____ *effect* on an *equilibrium*. It just establishes itself quicker.

130. _____ (ΔH) is the heat energy gained or lost in a reaction.

131. _____ is high in a highly unorganized system, such as a gas, a messy room, etc.

132. USE THE REFERENCE TABLES

133. **Oxidation** is the _____ of **electrons** by an atom or ion. The oxidation number _____ as a result. The electrons are on the *right side* of the reaction arrow.



134. **Reduction** is the _____ of **electrons** by an atom or ion. The oxidation number _____ (is reduced!) as a result. The electrons are on the *left side* of the reaction arrow.

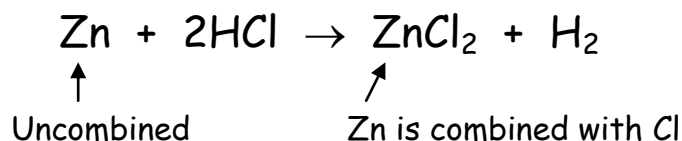


135. Redox reactions **always** involve the exchange of _____.

136. Remember.... "LEO the lion says GER!"

L ose	G ain
E lectrons	E lectrons
O xidation	R eduction

137. **Identify redox reactions** by seeking an uncombined element on one side of a reaction that is in a compound on the other side.



138. **Oxidizing agents** are what *get reduced* in a redox reaction.

Reducing agents are what *get oxidized* in a redox reaction.

139. _____ **cells** produce electricity with a *spontaneous* redox reaction.

140. The *left electrode* is usually the site of *oxidation* in an electrochemical cell diagram.

141. Memorize this saying... "I have **AN OX** and a **RED CAT**."
In electrochemical cells, the **AN**ode gets **OX**idized and **RED**uction occurs at the **CAT**hode.
142. _____ **cells** use a battery to force a nonspontaneous reaction.
143. Electrolytic cells are usually used for metal plating of objects.
144. **Acids** and **bases** are both **good** _____. Their solutions conduct electricity well.
145. Weak acids taste _____.
146. Weak bases taste _____.
147. Acids and bases turn _____ different colors. They're listed on **Table** _____.
148. _____ have a pH < 7.
149. _____ have a pH > 7.
150. **Tables** ____ & ____ list names and formulas of common acids and bases asked about on the Regents.
151. The metals above H₂ on **Table** ____ will react with acids to make H₂ gas bubbles.
152. **Arrhenius** says:
"_____ give off H⁺ or H₃O⁺ ions in solution."
"_____ give off OH⁻ ions in solution."
153. Acids and bases react in **neutralization** reactions to make _____ and a _____.
154. _____ are controlled neutralization reactions used to find the concentration of an acid or base sample. Note the formula for it on Table T.
155. ALL organic compounds contain the element _____.

156. **Carbon** ALWAYS makes _____ **bonds** in molecules.
157. _____ hydrocarbons have all *single* bonds within them (alkanes).
158. _____ hydrocarbons have *double* or *triple* bonds in them (alkenes & alkynes).
159. _____ contain ONLY the elements hydrogen and carbon.
160. The *homologous series* of hydrocarbons' formulas are on **Reference Table** _____.
161. The *functional groups* on organic molecules are listed on **Reference Table** _____.
162. _____ of organic compounds have *different* structural formulas but the *same* molecular formula.
163. Number the parent carbon chain in an organic molecule from the end closest to the alkyl group(s).
164. _____ **reactions** occur when a hydrocarbon reacts with oxygen to make CO_2 and H_2O .
165. **Organic** _____ **reactions** occur when an alkane and a halogen (Group 17) reacts so that one or more hydrogen atoms on the alkane are replaced with oxygen.
166. **Organic** _____ **reactions** occur when an alkene or alkyne combine with a halogen to make one product (halide).
167. _____ occurs when an organic acid and an alcohol react to make water and an _____.
168. _____ occurs when an ester reacts with a base to make alcohol and a _____.
169. _____ reactions occur when yeast catalyze a sugar ($\text{C}_6\text{H}_{12}\text{O}_6$) to make carbon dioxide and ethanol.
170. _____ are long chains of repeating units called **monomers**.
171. Polymers form by **polymerization** reactions.
172. _____ **polymerization** occurs when unsaturated monomers join in a long polymer chain.



173. USE YOUR REFERENCE TABLES!!!

174. _____ **polymerization** occurs when monomers join to form a polymer *by removing water*. Water is a product!

175. **Natural polymers** include starch, cellulose, and proteins.

176. **Synthetic polymers** include plastics such as nylon, rayon, and polyester.

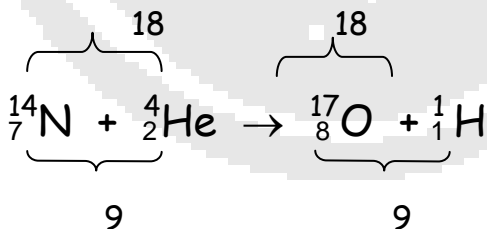
177. Unstable atoms that are radioactive are called _____. (*Table N*)

178. Radioisotopes can decay by giving off any of the particles/emanations listed in *Table* _____.

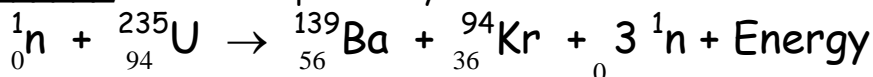
179. _____ **particles** (see Table O) are positively charged (+).

_____ **particles** (see Table O) are negatively charged (-).

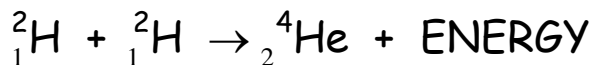
180. The sum of the mass numbers and atomic numbers must be equal on both sides of the reaction arrow for nuclear equations.



181. _____ **reactions** split heavy nuclei into smaller ones.



182. _____ **reactions** occur when light nuclei combine to form a heavy nucleus and *a lot of energy*.



183. The _____ **life** of a radioisotope is the *length of time* it takes for one half of the atoms in a sample to radioactively decay. (*Table N*)

184. C-14 is used to determine the ages of organic material up to 23,000 years old.
185. U-238 is used to determine the ages of rocks.
186. I-131 is used to treat thyroid disorders.
187. Co-60 is used to treat cancer tumors.
188. Radiation can be used to kill bacteria on foods to slow the spoilage process.
189. Disposal of radioactive waste is a problem associated with nuclear reactors.
190. USE THE REFERENCE TABLES!!!
191. Be sure to answer every question. If you don't know the answer, take a guess. Some chance of getting it right is better than none at all.
192. You have three hours to take the test, so take your time.
193. Try substituting words that seem confusing with a different word. Sometimes this makes the question make more sense. (ex.: substitute the word "false" for "not true")
194. *Consider on every question if the answer is in the reference tables or if the reference tables could help you.*
195. Your first choice is usually your best one. Only change an answer if you find an obvious mistake when checking your work.
196. Even if you think you know a formula, look it up. Most are on last page.
197. Skip a question if it is giving you a hard time. Go back to it later. Something else in the test may help you answer the harder problem.
198. Eat a healthy meal the night before and for breakfast as well.
199. Get a good night's sleep. A tired mind is not as sharp and clear as a well-rested one.
200. Relax - you've seen all this stuff before!