Name_____*Key*_____ (print) Name _____(sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions.   (2 pts
AND sign exam)   *PINK*

**Part I   MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.   (No
Partial Credit for MC) (3 pts per question, 24 pts pts total)**

1) The longest day (daylight) of the year for the Northern Hemisphere occurs at the time of the   1) __D__
   A) autumnal equinox   B) winter solstice
   C) vernal equinox   (D) summer solstice

2) The process by which liquid fats, such as vegetable oils (with double bonds - alkenes),   2) __A__
   can be converted to solid fats (without double bonds by adding hydrogens) is called
   (A) hydrogenation   B) oxygenation   C) carbonation   D) saturation

3) Compounds that have the same molecular formula but different structural formulas are   3) __B__
   called structural, or constitutional
   A) congeners   (B) isomer   C) derivative   D) isotope

4) .In organic molecules, a carbon atom will normally form how many bonds?   4) __C__
   A) 1   B) 3   (C) 4   D) 2

5) A balanced chemical equation will have the same _____ on each side.   5) __C__
   A) mass of each compound   B) number of molecules
   (C) number of atoms of each element   D) number of moles

6) _____ is due to heat radiation from the sun being reflected back to the earth by gases (carbon   6) __C__
   dioxide and water vapor) in the atomorphere like the glass in a greenhouse
   A) aurora   B) ozone effect
   (C) greenhouse effect   D) Rayleigh scattering

7) Rounding the number 200.601 to three significant figures   7) __C__
   A) gives 199   B) gives 200.   (C) gives 201   D) gives 200.601

8) Carbon dioxide in the atmosphere is supplied by: ←   8) __A__
   A) B & D   B) waste product of animals
   C) waste product of plant   D) burning gasoline. or other fuel

9) Solutions are   9) __D__
   A) heterogeneous mixture   B) none of the above
   C) non uniform mixture   (D) homogeneous mixtures

10) The substances that are formed by a chemical reaction are called the   10) __D__

   A) chemicals.   B) precipitates.   C) reactants   (D) products.

Part II: Short Answers (46 pts) Show work on all questions for **partial and full credit** even on questions which do not specify.

1   Identify the following as **(A) element   (B) compound** (by filling in the blank with the letters). (hint: you may want to look at the periodic table to find elements) (6 pts, 3 pts each)
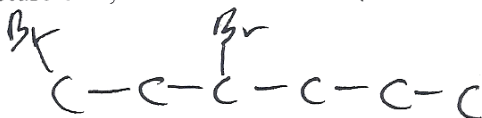
B _A_   B Cl_3 _B_

2   Given the following miniaturized periodic table, fill in the blank with the correct letter. (6 pts, 3 pts each)

(A) period   (B) group   (C) main group (representative elements)   (D) transition metal elements   (E) lanthanide/actinide

3   a.   Match the following by filling in the blank with one of the following words.
Gas,   Liquid,   Aqueous   (6 pts, 2 pts each)

(aq) _aqueous_ (l) _liquid_   (g) _gas_

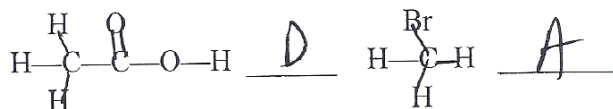4.   Draw the structure of 1,3- dibromohexane   (Br = bromo, hexane = 6 C alkane)   (4 pts)
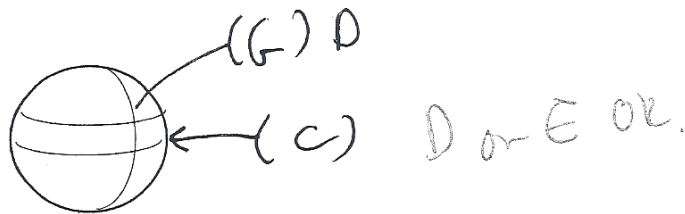

5.   **Functional Groups:**

   A. Fill in the blank with the letter of the functional group.   (6 pts, 3 pts each)

(A)   Alkyl halide   R—X   (B) Alcohol R—O—H   (C) Amine R—NH_2

(D) carboxylic acid R—C(=O)—O—H   (E) Amide R—C(=O)—NHR'   (F) ester R—C(=O)—O—R'

 _D_   _A_

6. Fill in the parenthesis with the letter of the word (A) north pole (B) south pole (C) equator (D) meridian (E) parallel (F) latitude (G) longitude (6 pts, 3 pts each)

((G) D

(C) D or E OR.

7. Circle the parenthesis which best matches within the brackets. (12 pts, 2 pts each)

(1) The fraction of incident sunlight reflected by an object or a measure of how reflective the surface of a planet or other object is called [(albedo) or (parallex)] (circle one)

(2) A planet moves faster when it is closer to the sun in its elliptical path. (law of equal areas) is [(the Heliocentric Model) or (Kepler's 2nd Law)]

(3) $T^2 = kR^3$ where T = time for one revolution of a planet around the sun and where R = average distance of the planet to the sun.   This law allows astronomers to calculate time for one revolution of a planet around the sun for a known average distance of the planet to the sun.   [(aberration of starlight) or (Kepler's 3rd law)]

(4) All planets in the solar system [(rotate on its axis) or (are in orbit around the sun) or (all planets do both)].

(5) The earth revolution is in the form of an [(round circle) or (ellipse)]. (Kepler's 1st Law)
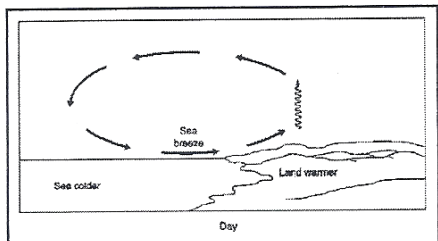
(12) .   The figure shows how the land heats faster than the water during the day and that during the day the breeze moves from the [(sea to the land) or (land to the sea)] (circle one).

Part III: **Long Answers** (24 pts) Show work on all questions for partial and full credit even on questions which do not specify.   Remember "attempt" points.

1. Convert the following. Show work.   (10 pts)

from   18.22 milligrams to ounces (1000 milligrams = 1 gram, 453.6 grams = 1 pound, 16 ounces = 1 pound)

$$18.22 \, mg \times \frac{1 \, g}{1000 \, mg} \times \frac{1 \, lb}{453.6 \, g} \times \frac{16 \, ounces}{1 \, lb} =$$

$$6.427 \times 10^{-4}$$
ounces

2   What is the molarity of a solution made by dissolving 1.5   moles of solute (Li Cl) in water to make
up 1.78   Liters of the salt solution ?   (Molarity = moles solute / liters of solution)   (6 pts)

$$M = \frac{1.5 \, moles \, LiCl}{1.78 \, l \, solution} = 0.84 \, M$$

3 Constitutional Isomer - (8 pts, 4 pts each)
Show two constitutional isomers of the following molecule

H—C—C—C—C—C—C—C—C—H   8 carbon molecule

(with H atoms on each carbon, 8 carbon chain)

C—C—C—C—C—C—C
          |
          C

C—C—C—C—C
    | | |
    C   C   C

Name____*Key*_____ (print) Name _____(sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions.   (2 pts AND sign exam)

Part I   MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.   (No Partial Credit for MC) (3 pts per question, 24 pts pts total)

1) The substances that are formed by a chemical reaction are called the   1) __C__

  A) chemicals.   B) reactants   C) products.   D) precipitates.

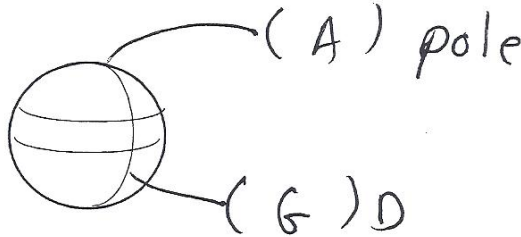2) _____ is due to heat radiation from the sun being reflected back to the earth by gases (carbon   2) __B__
   dioxide and water vapor) in the atomorphere like the glass in a greenhouse
   A) aurora   B) greenhouse effect
   C) Rayleigh scattering   D) ozone effect

3) Solutions are   3) __D__
   A) heterogeneous mixture   B) non uniform mixture
   C) none of the above   D) homogeneous mixtures

4) The process by which liquid fats, such as vegetable oils (with double bonds - alkenes),   4) __B__
   can be converted to solid fats (without double bonds by adding hydrogens) is called
   A) carbonation   B) hydrogenation   C) saturation   D) oxygenation

5) Rounding the number 200.601 to three significant figures   5) __D__
   A) gives 200.601   B) gives 200.   C) gives 199   D) gives 201

6) Carbon dioxide in the atmosphere is supplied by: 6) __D__
   A) waste product of animals   B) burning gasoline. or other fuel
   C) waste product of plant   D) A & B

7) A balanced chemical equation will have the same _____ on each side.   7) __A__
   A) number of atoms of each element   B) mass of each compound
   C) number of molecules   D) number of moles

8) .In organic molecules, a carbon atom will normally form how many bonds?   8) __D__
   A) 1   B) 3   C) 2   D) 4

9) The longest day (daylight) of the year for the Northern Hemisphere occurs at the time of the   9) __A__
   A) summer solstice   B) autumnal equinox
   C) vernal equinox   D) winter solstice

10) Compounds that have the same molecular formula but different structural formulas are   10) __D__
    called structural, or constitutional
    A) derivative   B) isotope   C) congeners   D) isomer

Part II: Short Answers (46 pts) Show work on all questions for **partial and full credit** even on questions which do not specify.

1   Identify the following as **(A) element (B) compound** (by filling in the blank with the letters). (hint: you may want to look at the periodic table to find elements)   (6 pts, 3 pts each)

N __A__   N O$_2$ __B__

2   Given the following miniaturized periodic table, fill in the blank with the correct letter. (6 pts, 3 pts each)

(A) period   (B) group   (C) main group (representative elements) (D) transition metal elements   (E) lanthanide/actinide

(B)   (D)

3   a.   Match the following by filling in the blank with one of the following words.
Gas, Liquid,   Aqueous (6 pts, 2 pts each)

(l) __liquid__   (aq) __aqueous__   (g) __gas__

4.   Draw the structure of 1,4-dimethyloctane (F = floro, octane = 8 C alkane) (4 pts)

F   fluoro

C—C—C—C—C—C—C—C
            |
            F

5. **Functional Groups:**

   A. Fill in the blank with the letter of the functional group. (6 pts, 3 pts each)

(A)   Alkyl halide   R—X   (B) Alcohol R—O—H   (C) Amine R—NH$_2$

(D) carboxylic acid R—$\overset{O}{\overset{||}{C}}$—O—H   (E) Amide R—$\overset{O}{\overset{||}{C}}$—NHR' (F) ester R—$\overset{O}{\overset{||}{C}}$—O—R'

H—$\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}$—$\overset{O}{\overset{||}{C}}$—N—H   E   H—$\overset{\overset{H}{|}}{\underset{\underset{\overset{O}{\underset{H}{|}}}{|}}{C}}$—H   B

H   H

4. Fill in the parenthesis with the letter of the word   (A) north pole   (B) south pole   (C) equator   (D) meridian   (E) parallel   (F) latitude   (G) longitude   (6 pts, 3 pts each)

(A) pole

(G) D

5. Circle the parenthesis which best matches within the brackets. (12 pts, 2 pts each)

(1) The fraction of incident sunlight reflected by an object or a measure of how reflective the surface of a planet or other object is called [(parallex) or (albedo)] (circle one)

(2) A planet moves faster when it is closer to the sun in its elliptical path. (law of equal areas) is [(Kepler's 2nd Law) or (Heliocentric Model)]

(3) $T^2 = kR^3$ where T = time for one revolution of a planet around the sun and where R = average distance of the planet to the sun.   This law allows astronomers to calculate time for one revolution of a planet around the sun for a known average distance of the planet to the sun.   [(Kepler's 3rd law) or (aberration of starlight)]

(4) All planets in the solar system [(rotate on its axis) or (are in orbit around the sun) or (all planets do both)].

(5) The earth revolution is in the form of an [(ellipse) or (round circle)]. (Kepler's 1st Law)
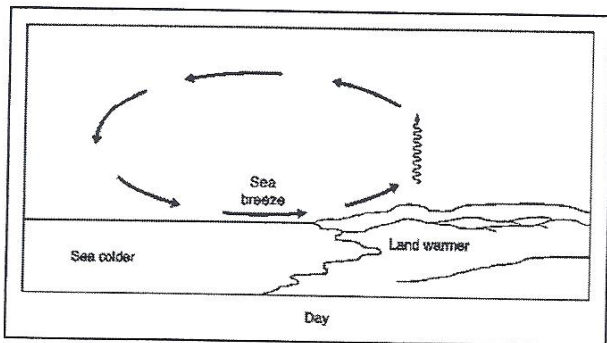
(6) .   The figure shows how the land heats faster than the water during the day and that during the day the breeze moves from the [(land to the sea) or (sea to land)] (circle one).

Part III: Long Answers (24 pts) Show work on all questions for partial and full credit even on questions which do not specify. Remember "attempt" points.

1. Convert the following. Show work. (10 pts)

from 89.238 meters to feet (12 inches = 1 foot, 2.54 cm = 1 inch, 100 cm = 1 meter)

$$89.238 \, \cancel{m} \times \frac{100 \, \cancel{cm}}{1 \, \cancel{meter}} \times \frac{1 \, \cancel{inch}}{2.54 \, \cancel{cm}} \times \frac{1 \, foot}{12 \, \cancel{inches}} =$$

292.8 feet

2. What is the molarity of a solution made by dissolving 7.2 moles of solute (Li Cl) in water to make up 0.788 Liters of the salt solution? (Molarity = moles solute / liters of solution) (6 pts)

$$M = \frac{7.2 \, mol \, Li \, Cl}{0.788 \, \ell \, soln.} = 9.1 \, M$$

3 Constitutional Isomer - (8 pts)
Show two constitutional isomers of the following molecule
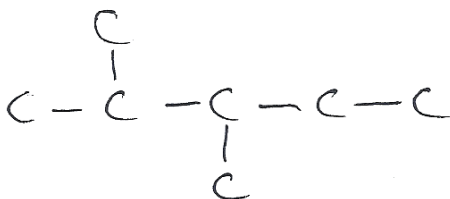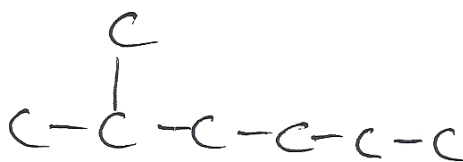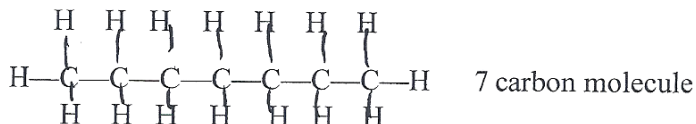
7 carbon molecule

Name_____Key_____ (print) Name _____(sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions.   (2 pts AND sign exam)

Pink

Part I   MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.   (No Partial Credit for MC) (3 pts per question, 24 pts pts total)

1) Compounds that have the same molecular formula but different structural formulas are   1) __C__
   called structural, or constitutional
   A) congeners   B) isotope   C) isomer   D) derivative

2) _____ is due to heat radiation from the sun being reflected back to the earth by gases (carbon   2) __D__
   dioxide and water vapor) in the atomorphere like the glass in a greenhouse
   A) ozone effect   B) aurora
   C) Rayleigh scattering   D) greenhouse effect

3) The longest day (daylight) of the year for the Northern Hemisphere occurs at the time of the   3) __C__
   A) winter solstice   B) vernal equinox
   C) summer solstice   D) autumnal equinox

4) Rounding the number 200.601 to three significant figures   4) __B__
   A) gives 200.601   B) gives 201   C) gives 200.   D) gives 199

5) .In organic molecules, a carbon atom will normally form how many bonds?   5) __D__
   A) 2   B) 3   C) 1   D) 4

6) Carbon dioxide in the atmosphere is supplied by: A & D   6) __B__
   A) burning gasoline. or other fuel   B) B & C
   C) waste product of plant   D) waste product of animals

7) The process by which liquid fats, such as vegetable oils (with double bonds - alkenes),   7) __A__
   can be converted to solid fats (without double bonds by adding hydrogens) is called
   A) hydrogenation   B) oxygenation   C) carbonation   D) saturation

8) Solutions are   8) __B__
   A) heterogeneous mixture   B) homogeneous mixtures
   C) non uniform mixture   D) none of the above

9) The substances that are formed by a chemical reaction are called the   9) __B__

   A) precipitates.   B) products.   C) chemicals.   D) reactants

10) A balanced chemical equation will have the same _____ on each side.   10) __D__
   A) number of molecules   B) number of moles
   C) mass of each compound   D) number of atoms of each element

Part II: **Short Answers** (46 pts) Show work on all questions for **partial and full credit** even on questions which do not specify.

1   Identify the following as **(A) element** **(B) compound** (by filling in the blank with the letters). (hint: you may want to look at the periodic table to find elements)   (6 pts, 3 pts each)

SO_2 __*B*__   S __*A*__

2   Given the following miniaturized periodic table, fill in the blank with the correct letter. (6 pts, 3 pts each)

(A) period   (B) group   (C) main group (representative elements)   (D) transition metal elements   (E) lanthanide/actinide
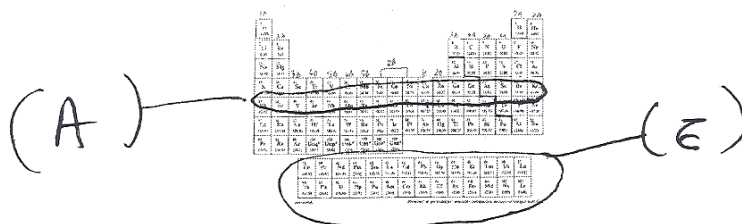
3   a.   Match the following by filling in the blank with one of the following words.
Gas,   Liquid,   Aqueous   (6 pts, 2 pts each)

(g) __*gas*__   (aq) __*aqueous*__   (l) __*liquid*__

4.   Draw the structure of 1,2-dichloropentane (Cl = chloro, pentane = 5 C alkane) (4 pts)
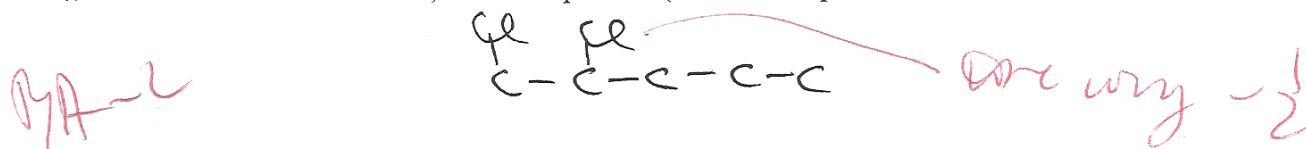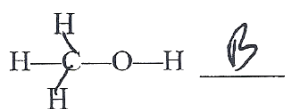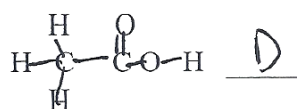
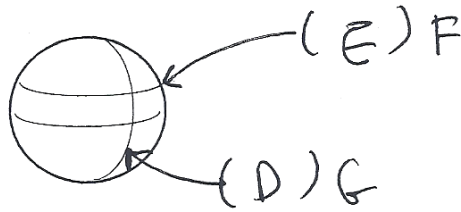

5. **Functional Groups:**

A. Fill in the blank with the letter of the functional group.   (6 pts, 3 pts each)

(A)   Alkyl halide   R—X   (B) Alcohol R—O—H   (C) Amine R—NH$_2$

(D) carboxylic acid R—C(=O)—O—H   (E) Amide R—C(=O)—NHR'   (F) ester R—C(=O)—O—R'

6. Fill in the parenthesis with the letter of the word   (A) north pole   (B) south pole   (C) equator   (D) meridian   (E) parallel   (F) latitude   (G) longitude   (6 pts, 3 pts each)


(E) F
(D) G

7. Circle the parenthesis which best matches within the brackets. (12 pts, 2 pts each)

(1) Apparent motion between two fixed objects when the observer changes position. (can be used to prove that the earth revolves around the sun) (example: finger over distant object, move head)   [(albedo) or (parallex)]

(2) Used by astronomers to determine that the earth rotates on its axis at 15° per hour. [(AU) or (Foucault Pendulum)]

(3) In our solar system   [(the Sun) or (Jupiter)] is 99.87% of the mass of the solar system.

(4) Unmanned spacecraft [(has) or (has never)] landed on Mars
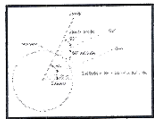
(5)   This figure can be used to figure out   [(latitude) or (longitude)]
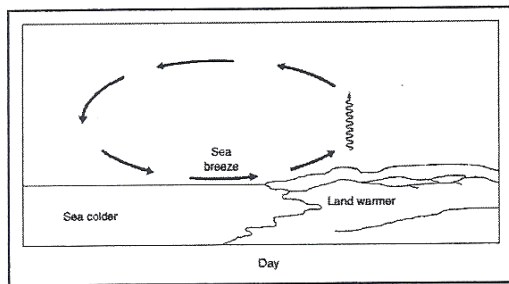
(6) .   The figure shows how the land heats faster than the water during the day and that during the day the breeze moves from the   [(sea to the land) or (land to the sea)] (circle one).

Part III: **Long Answers** (24 pts) Show work on all questions for partial and full credit even on questions which do not specify. Remember "attempt" points.

1. Convert the following. Show work. (10 pts)

from 72.5 yards to centimeters (1 yard = 3 feet, 12 inches = 1 foot, 2.54 cm = 1 inch)   *attempt –2*

$$72.5 \, yd \times \frac{3 \, feet}{1 \, yd} \times \frac{12 \, inches}{1 \, foot} \times \frac{2.54 \, cm}{1 \, in} = 6629.4 \, cm$$
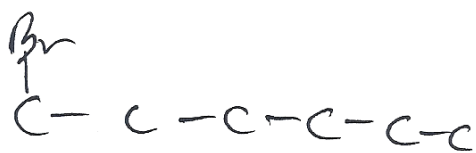
3 s.f.

$$6.63 \times 10^3 \, cm$$

2. What is the molarity of a solution made by dissolving 0.89 moles of solute (Li Cl) in water to make up 1.29 Liters of the salt solution? (Molarity = moles solute / liters of solution) (6 pts)

$$\frac{0.89 \, mol}{1.29 \, \ell} = 0.69 \, M$$

math   *attempt   1*

–2

3. Constitutional Isomer - (8 pts, 4 pts each)
Show two constitutional isomers of the following molecule

```
   H   H   H   Br  H   H
H—C—C—C—C—C—C—H      6 carbon alkane
   H   H   H   H   H   H          with Br
```

```
  Br
   |
   C— c —c—c—c-c      4 pt attempt –½
```

```
      c
      |
  c-c-c—c—Br   4 pt
      |
      c
```

Final Exam Physical Science (PSC 102) Form B 12/12/18 W 11 am MWF Dr. Hahn   Exam # _____
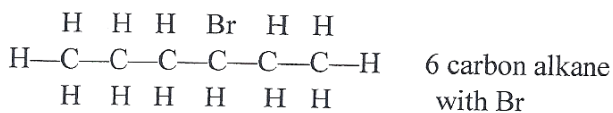
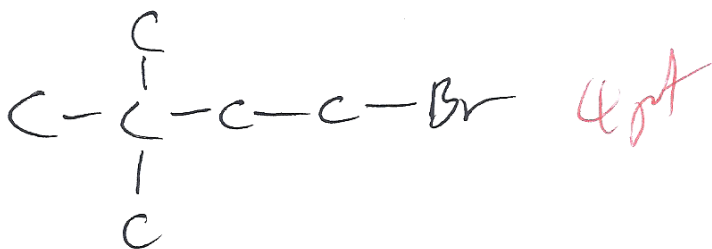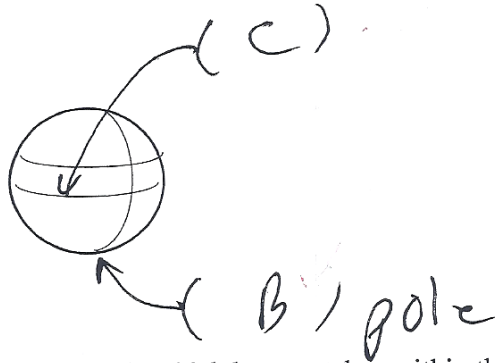Name____Key_____ (print) Name _____(sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions.   (2 pts AND sign exam)

Part I   MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.   (No Partial Credit for MC) (3 pts per question, 24 pts pts total)

1) A balanced chemical equation will have the same _____ on each side.
   A) number of molecules   B) mass of each compound
   C) number of atoms of each element   D) number of moles
1) __C__

2) The longest day (daylight) of the year for the Northern Hemisphere occurs at the time of the
   A) vernal equinox   B) winter solstice
   C) autumnal equinox   D) summer solstice
2) __D__

3) _____ is due to heat radiation from the sun being reflected back to the earth by gases (carbon dioxide and water vapor) in the atomorphere like the glass in a greenhouse
   A) ozone effect   B) aurora
   C) Rayleigh scattering   D) greenhouse effect
3) __D__

4) .In organic molecules, a carbon atom will normally form how many bonds?
   A) 3   B) 1   C) 4   D) 2
4) __C__

5) Compounds that have the same molecular formula but different structural formulas are called structural, or constitutional
   A) congeners   B) derivative   C) isomer   D) isotope
5) __C__

6) Solutions are
   A) homogeneous mixtures   B) none of the above
   C) non uniform mixture   D) heterogeneous mixture
6) __A__

7) Rounding the number 200.601 to three significant figures
   A) gives 199   B) gives 200.601   C) gives 200.   D) gives 201
7) __D__

8) Carbon dioxide in the atmosphere is supplied by:
   A) waste product of animals   B) burning gasoline. or other fuel
   C) B&C A & B   D) waste product of plant
8) __C__

9) The substances that are formed by a chemical reaction are called the
   A) products.   B) reactants   C) precipitates.   D) chemicals.
9) __A__

10) The process by which liquid fats, such as vegetable oils (with double bonds - alkenes), can be converted to solid fats (without double bonds by adding hydrogens) is called
   A) hydrogenation   B) saturation   C) carbonation   D) oxygenation
10) __A__

Part II: **Short Answers** (46 pts) Show work on all questions for **partial and full credit** even on questions which do not specify.

1   Identify the following as **(A) element (B) compound** (by filling in the blank with the letters). (hint: you may want to look at the periodic table to find elements) (6 pts, 3 pts each)

CO_2 ___B___   C ___A___

2   Given the following miniaturized periodic table, fill in the blank with the correct letter. (6 pts, 3 pts each)

(A) period   (B) group   (C) main group (representative elements)   (D) transition metal elements (E) lanthanide/actinide

(D)

(B)

3   a.   Match the following by filling in the blank with one of the following words.
Gas,   Liquid,   Aqueous   (6 pts, 2 pts each)

(g) ___Gas___   (l) ___liquid___   (aq) ___aqueous___

4.   Draw the structure of 1,4-iodoheptane (I = iodo, heptane = 7 C alkane) (4 pts)

left off br th ?

5. **Functional Groups:**

A. Fill in the blank with the letter of the functional group.   (6 pts, 3 pts each)

(A)   Alkyl halide   R—X   (B) Alcohol R—O—H   (C) Amine R—NH₂

(D) carboxylic acid R—C(O)—O—H   (E) Amide R—C(O)—NHR'   (F) ester R—C(O)—O—R'

4. Fill in the parenthesis with the letter of the word   (A) north pole   (B) south pole   (C) equator   (D) meridian   (E) parallel   (F) latitude   (G) longitude   (6 pts, 3 pts each)

(C)

(B) pole

5. Circle the parenthesis which best matches within the brackets. (12 pts, 2 pts each)

(1) A planet moves faster when it is closer to the sun in its elliptical path. (law of equal areas) is
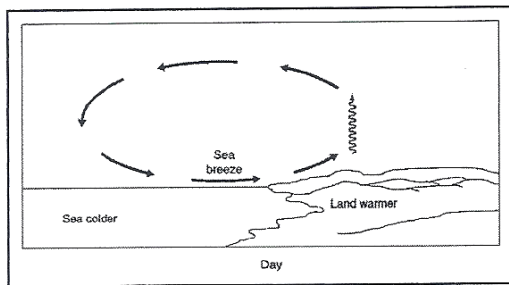[(Kepler's 2nd Law) or (Heliocentric Model)]

(2) Used by astronomers to determine that the earth rotates on its axis at 15° per hour.
[(Foucault Pendulum) or (AU)]

(3) In our solar system   [(Jupiter) or (the Sun)] is 99.87% of the mass of the solar system.

(4) Unmanned spacecraft [(has never) or (has)] landed on Mars

(5)   This figure can be used to figure out   [(longitude) or (latitude)]

(6) .   The figure shows how the land heats faster than the water
during the day and that during the day the breeze moves from the   [(land to the sea) or (sea to the land)] (circle one).

Part III: **Long Answers** (24 pts) Show work on all questions for partial and full credit even on questions which do not specify. Remember "attempt" points.

1. Convert the following. Show work. (10 pts)

attempt -2

from 234.5 milliLiter to cups (1000 mL = 1 Liter, 1 liter = 1.06 quart, 4 cups = 1 quart,)

BA -5

$$234.5 \, mL \times \frac{1 \, L}{1000 \, mL} \times \frac{1.06 \, qt}{1 \, L} \times \frac{4 \, cups}{1 \, qt} = 0.9943 \, cups$$

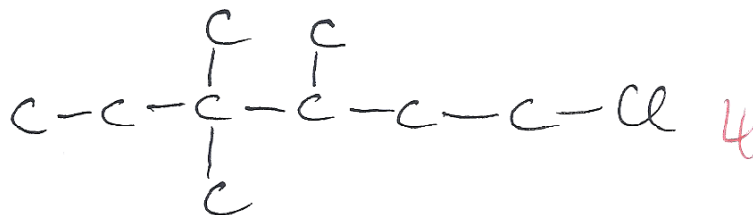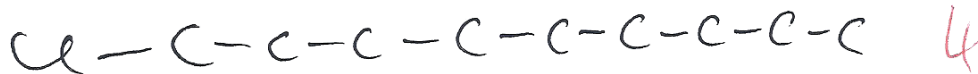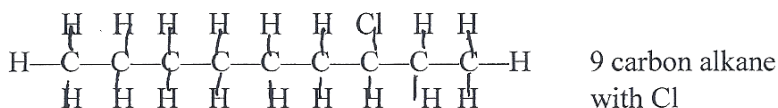✓ ... 2 ... 2 ... 2 ... 2 ... 2

math -½

2   What is the molarity of a solution made by dissolving 0.76 moles of solute (Li Cl) in water to make up 5.78 Liters of the salt solution ? (Molarity = moles solute / liters of solution) (6 pts)

$$\frac{0.76 \, mol \, LiCl}{5.78 \, l} = 0.13 \, M$$

-1
attempt math -1

3 Constitutional Isomer - (8 pts, 4 pts each)
Show two constitutional isomers of the following molecule

$$H-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-\overset{\overset{\displaystyle Cl}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-\overset{\overset{\displaystyle H}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-H$$

9 carbon alkane
with Cl

$$Cl-C-C-C-C-C-C-C-C-C \quad 4$$
(attempt -2)

$$C-C-\overset{\overset{\displaystyle C}{|}}{\underset{\underset{\displaystyle C}{|}}{C}}-\overset{\overset{\displaystyle C}{|}}{C}-C-C-Cl \quad 4$$