Study Guide Quarter 3 Exam Name Key Period____

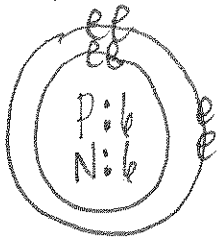
1. Use the periodic table to create an element square for Carbon. Identify the number of protons, neutrons, electrons, energy levels, period, group, atomic number, atomic mass, & symbol for Carbon.

group 14
period 2

atomic # → 6
C
atomic mass → 12.01

P: 6
E: 6
N: atomic mass − atomic #
12 − 6 = 6

2. Using the element square and information from above, draw the Bohr model for Carbon.



3. In what part of the atom is each subatomic particle found? Identify the charges of each particle. Which subatomic particles make up the atom's mass?

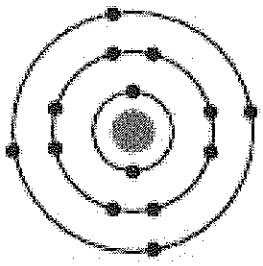
Protons & neutrons in the nucleus
Electrons on energy levels outside

Protons +
Electrons −
Neutrons no charge

4. What are valence electrons and what is their significance?

Valence electrons are the ones on the very outside energy level
They determine the reactivity of the atom

5. What element is this?



3 energy levels : period 3
4 valence electrons : group 14

Si

6. What do the groups and periods on the Periodic Table tell us? groups tell us the # of valence electrons period tells us how many shells or energy levels

7. Which groups on the Periodic Table are most reactive and why?

Groups 1 & 17 - Group 1 elements have 1 valence electron, so they only need to lose that electron to achieve an octet (full outer shell).
Groups 17 elements have 7 valence electrons & only need to gain 1 to achieve an octet

8. Where are metals, non-metals, and metalloids located on the Periodic Table and what are the properties of each? metals on left shiny (lusters), conductors, ductile, malleable, silver-gray, react w/acid, give up electrons; metalloids in middle along staircase ppties. of both metals & non-metals; non-metals on right dull, don't conduct, brittle, don't react w/acids, steal electrons in a reaction

9. What occurs in a chemical reaction? What are the evidences a chemical reaction may have taken place?
electron shuffle - stealing/sharing of electrons - new substances are formed
state change, color change, gas produced, solid forms, temperature change

10. What is the difference between an element, an atom, a molecule, & a compound?
element - pure substance all same kind atoms; atom - smallest particle of an element that still maintains ppties. of the element; molecule - 2 or more atoms bonded together; compound - a molecule w/ 2 or more different elements

11. Balance the following chemical equations:

1. $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$ already balanced

2. $2H_2 + O_2 \rightarrow 2H_2O$

3. $H_2O_2 \rightarrow H_2 + O_2$ already balanced

In the examples above, can you identify which letters represent molecules and which represent atoms? Circle the molecules and ~~draw squares around the atoms~~. each molecule circled above contains 2 or more atoms - for example: H_2O molecule has 2 atoms of H & 1 atom of O

12. Complete the following table.

$MgSO_4 + 2HCl \rightarrow MgCl_2 + H_2SO_4$

Inventory the number of atoms present on the reactant side of the equation.		Inventory the number of atoms present on the product side of the equation.	
Magnesium	1	Magnesium	1
Sulfur	1	Sulfur	1
Oxygen	4	Oxygen	4
Hydrogen	2	Hydrogen	2
Chlorine	2	Chlorine	2

Is the equation above balanced? Explain. If the equation is unbalanced, rewrite the equation so it is balanced.
no - there are not the same # of atoms of hydrogen or chlorine on the reactant side as there are on the product side

13. In your own words, restate all three of Newton's Laws of Motion.

1st law - inertia - an object in motion will stay in motion & an object @ rest will stay @ rest

2nd law - F=m x a

3rd law action / reaction - for every action there is an equal & opposite reaction

14. How are inertia and mass related?

more mass = more inertia

15. If force is held constant, and mass is doubled, what happens to acceleration?

the acceleration would half

16. Acceleration due to Earth's gravity is 9.8 m/s^2. How fast will it be moving after a 3 second fall?

9.8 m/s the 1st second → 19.6 m/s the 2nd second → 29.4 m/s the 3rd second

17. What would the force be of a 2000 kg car accelerating at 25 m/s^2?

F = m x a

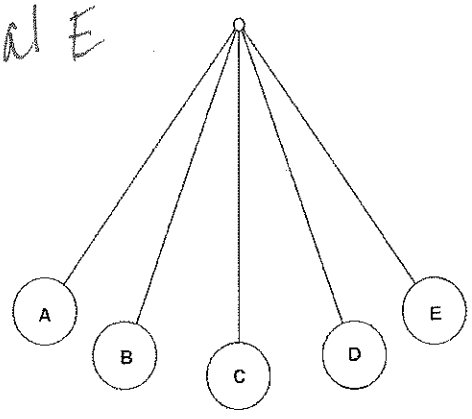
F = 2000 kg x 25 m/s^2

F = 50,000 N

18. At which position is potential energy the greatest? ....kinetic energy?

@ A & E - the potential E is the greatest

@ C - the kinetic E is the greatest



19. Match the example on the left with the energy transformation on the right.

Burning a candle	nuclear to electromagnetic and thermal
Sun	electromagnetic to chemical
Photosynthesis	chemical to electromagnetic and thermal

20. Trace listening to an iPod back to the Sun. Show all energy transformations.

Sun → radiant (Em) & thermal E → chemical E → thermal E → mechanical E → electrical E
(photosynthesis) (burning fossil fuels) (generator at power plant)
sound & light E ← electrical E ← chemical E (ipod battery)

21. When is work accomplished, and what are the units for work?

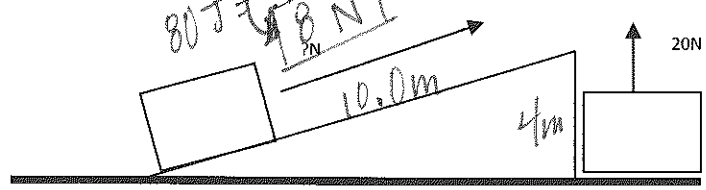
work is accomplished when a Force is applied & a distance is covered)

22. How much force is needed to move the box to the top of the ramp? How does the amount of work done using the ramp compare with lifting the box straight up?

Work is the same regardless of which way the box is moved

W=FxD

80 J = ?N · 10m
8 N



W= 20N · 4m
W= 80 N·m
W= 80 Joules

Length of ramp = 10.0 m

Height of ramp = 4 m

Weight of box = 20 Newtons

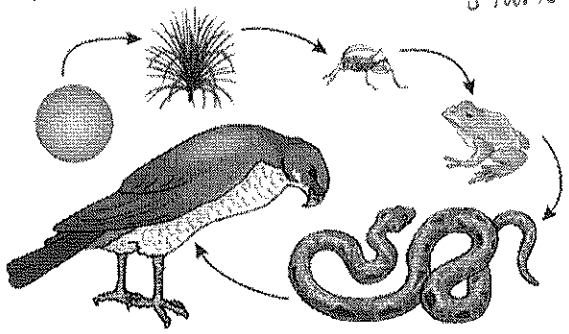
- using the ramp, only 8N of Force are required
- lifting the box straight up requires 20N of Force

23. Explain how food undergoes both physical and chemical changes as it is digested.

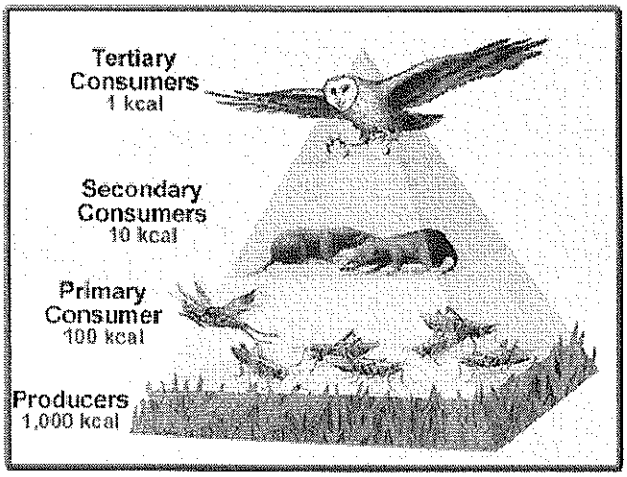
chewing - physical, saliva - chemical, peristalsis in esophagus - physical, mixing of food thru stomach contractions - physical, acid in stomach - chemical, both physical & chemical in intestines (peristalsis, absorption of H_2O) & enzyme release

24. Explain how energy moves in the diagram. Identify producers and consumers. What do the arrows represent?

starts w/ sun → producers (plant) → primary consumers (bug)
↓
(frog) secondary consumers
↓
(snake) tertiary consumers
↓
(hawk) quaternary consumers



25. Explain the meaning of the diagram below.



* the amount of Energy that is passed is 10% of the Energy @ the prior energy level
* the energy is lost as heat

26. Use the table to identify each unknown substance.

Substance	mass	volume
X magnesium	25.0g	14.70cm^3
Y mercury	50.0g	3.68cm^3
Z gasoline	1000.0	1428.57mL

Known densities

Magnesium = 1.7 g/cm^3

Mercury = 13.6 g/cm^3

Gasoline = 0.70 g/mL

$D = m/v$

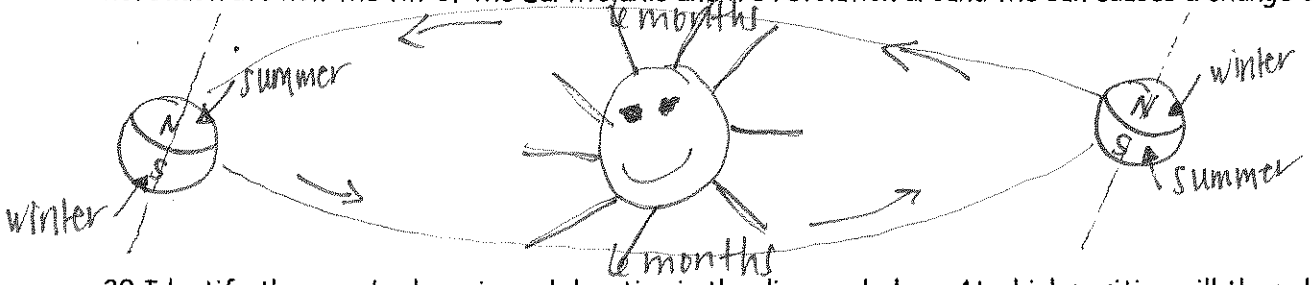
$25/14.7 = 1.7\ g/cm^3$

$50/3.68 = 13.6\ g/cm^3$

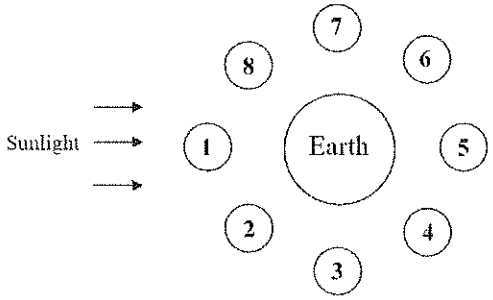
$1000\ g/1428.57 = 0.70\ g/mL$

27. Explain how the law of conservation of mass applies to a chemical reaction. the # of atoms of each element on the reactant side must be equal to the # of atoms of each element on the product side → this supports the law that matter cannot be created or destroyed

28. Illustrate how the tilt of the Earth's axis and it's revolution around the sun causes a change of seasons.



29 Identify the moon's phase in each location in the diagram below. At which position will there be a Spring tide. At which position will there be a Neap tide.



1 = new moon
2 = waxing crescent
3 = 1st quarter
4 = waxing gibbous
5 = full moon
6 = waning gibbous
7 = last quarter
8 = waning crescent

30. Put the following in order from smallest to largest.

solar system, universe, sun, planet, galaxy planet - sun - solar system - galaxy - universe

31. Explain the life cycle of our sun. sun is medium sized & will follow low mass pathway:

nebula -> protostar -> main sequence -> red giant -> white dwarf -> black dwarf

32. What is a light year? Why are they used instead of miles?

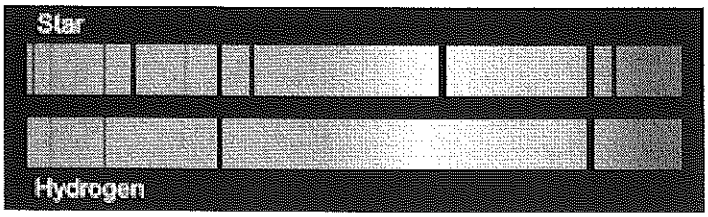
the distance light travels in one year distances within the Universe are enormous - w/ miles the # would get too big

33. If a star is 250 light years away from Earth, how long will it take for the light to reach the Earth? 250 years

How far in kilometers is this? (1 LY = 9.5 trillion km)

250 LY x 9.5 trillion km = 2.375 E 15 km

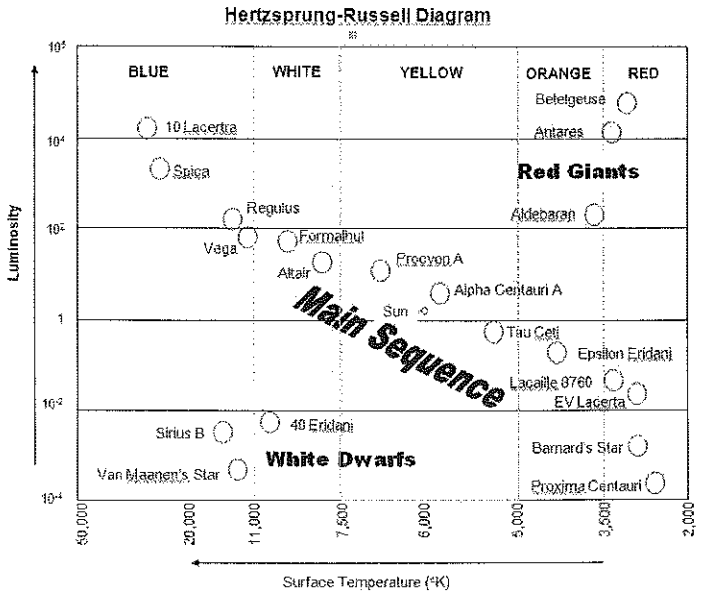
34. Explain how the information in the following spectrograph can help astronomers learn about stars.



with the known hydrogen spectrograph, it is easy to see that the star also has the same spectral lines (in addition to others). This tells us that hydrogen is present in the star

31. Use the HR diagram to answer the following questions.

- identify the trend for stars in the main sequence. as temp. ↑, brightness ↑
- what location will the star Regulus move to after it is no longer a main sequence star? red giant
- how are color and temperature related? red: cool blue: hot
- why is the star Betelgeuse so bright even though it has a low temperature? because of it's tremendous size

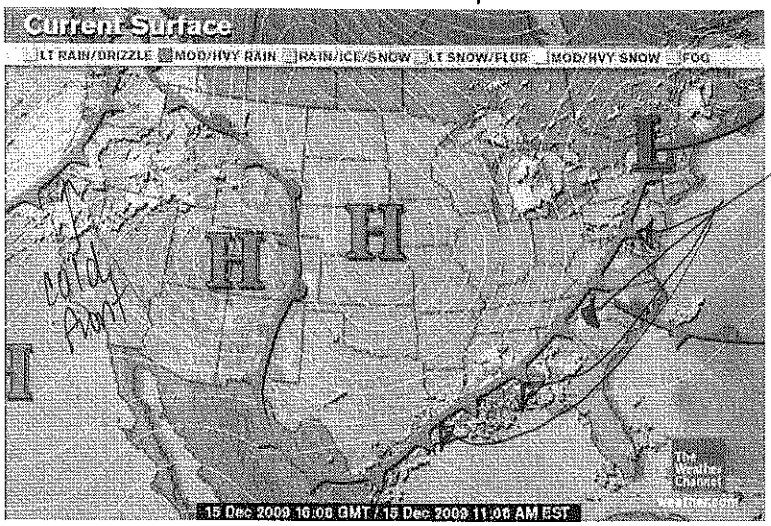


32. What is the force that governs the motion of objects in our solar system? Gravity

33. What are the negative effects of human activity on groundwater and surface water in a watershed?
pollution; consumption if too much water leading to depletion of freshwater

34. How is the sun involved in the formation of wind and ocean currents. Include the terms radiation, specific heat, uneven heating, density, pressure, convection. sun sends radiation to earth → uneven htg. due to earth's spherical shape & specific heat of water vs. land → heat moves to achieve thermal equilibrium → this movement in the air is called convection, otherwise known as wind → convection also takes place in the water & this is called ocean currents

35. Explain the changes in weather that will occur in the days that follow. Identify the cold fronts and warm fronts. What do the letters H & L represent?

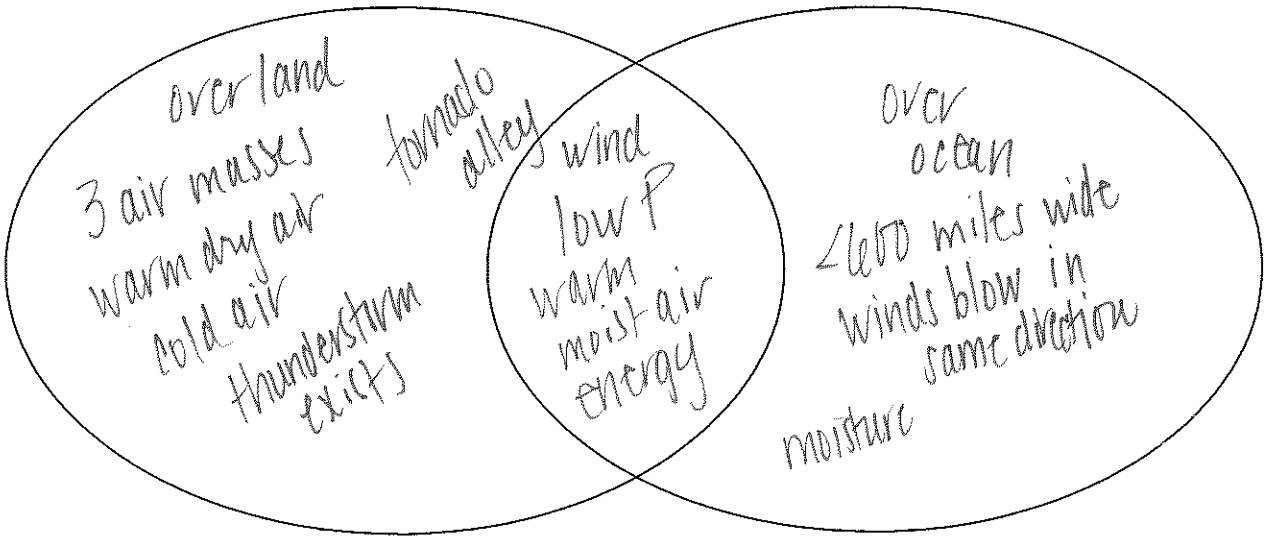


cold stormy weather will continue to move southeast to be replaced by cold dry sunny weather

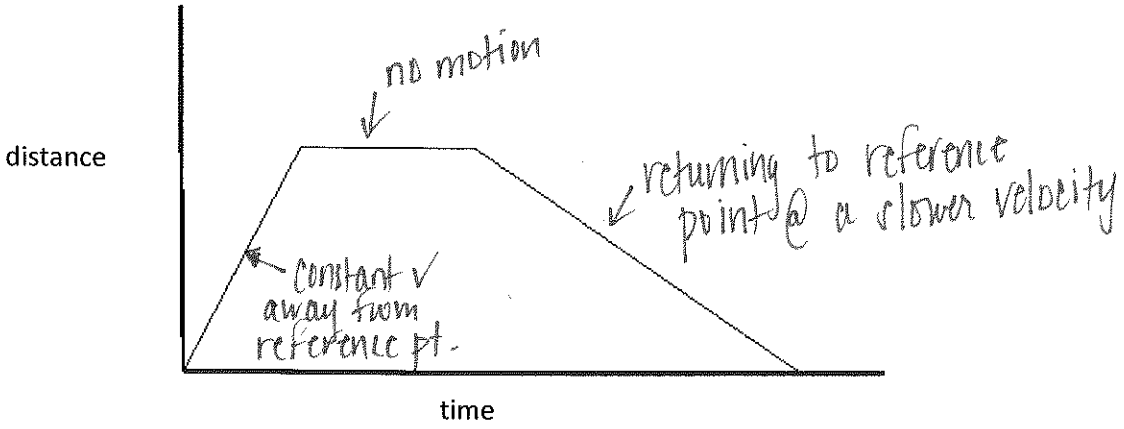
H = high pressure / sunny dry weather

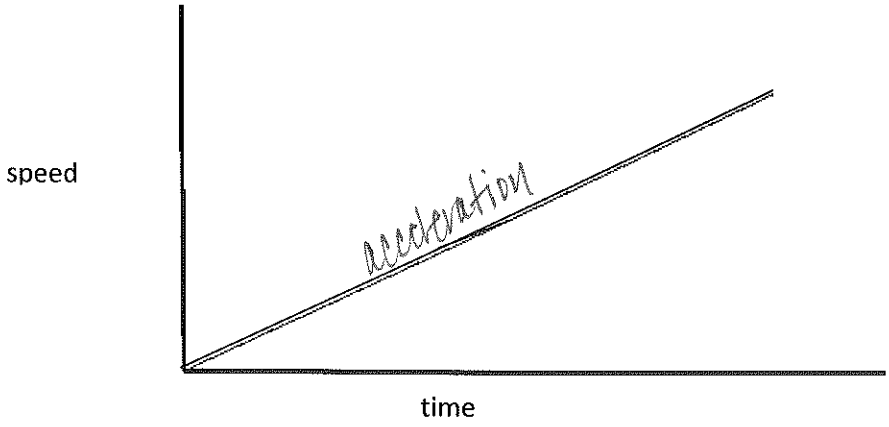
L = low pressure / lousy weather

36. Compare and contrast hurricanes and tornadoes by using a venn diagram.



37. Describe the motion in the following motion graphs.





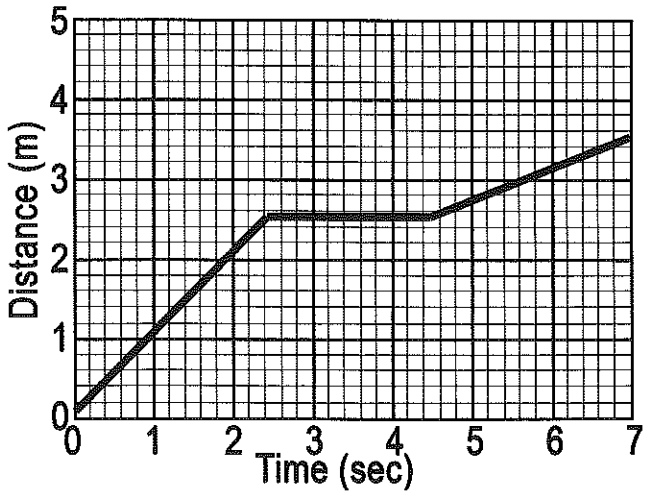
38. Describe the difference between speed, velocity, and acceleration.

speed - how fast velocity - speed + direction acceleration - → resulting from unbal. F → change in motion → speed up, slow down, change direction

39. How are force and acceleration related?

F=ma & unbalanced F lead to accel.

40. Calculate the average speed using the motion graph below.



$\frac{\text{total d}}{\text{total t}} = \text{avg speed}$

$\frac{3.5\text{ m}}{7\text{ sec}} = 0.5\text{ m/sec}$