

BIG BANG TO CURRENT EARTH-OVERVIEW AND BASIC MATH CONCEPTS

KIDS MATH-SCIENCE DIGITAL BOOK ON THE INTERNET

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by

**Angela Caldo, Debbie Caldo, Leanne Caldo
Angelo Karras, Hampton Karras, Tom Karras**

April 4, 2014

**Final Print Version, Happy 80th Birthday Hamp!
To My Wife, Our Mom, and Our Grandmother**



“STEM” WEBTREE BELOW AND THIS DIGITAL BOOK WILL HELP PREPARE STUDENTS FOR HIGH SCHOOL AND COLLEGE

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http://kids.earth.nasa.gov/archive/pangaea/Pangaea_game.html
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http://www.learner.org/resources/series42.html#program_descriptions
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<http://www.abc.net.au/news/specials/japan-quake-2011>
<http://www.divediscover.who.edu/iceage/timeline.html>
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<http://www.ewart.org.uk/physics/index.php?!=61>
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<http://video.pbs.org/video/2358778286/>
<http://www.solstation.com/stars/ast2belt.gif>
<http://www.swpc.noaa.gov/primer/primer.html>
http://www.youtube.com/watch?v=OZIB_leg75Q
<http://solarscience.msfc.nasa.gov/SolarWind.shtml>
http://standeyo.com/Earth_Changes/Threat_Watch.html
http://www.physics.sjsu.edu/becker/physics51/maq_field.htm
<http://www.citejournal.org/articles/v5i3seminal4/sine%20wave.html>
<http://archive.thedailystar.net/newDesign/news-details.php?nid=205023>
<http://edsect.blogspot.com/2013/07/motion-of-solar-system-in-milky-way.html>

Part 1: "BIG BANG TO CURRENT EARTH- OVERVIEW"
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www.KidsMathScienceDigitalBook.com

by
Angela Caldo, Debbie Caldo, Leanne Caldo,
Angelo Karras, Hampton Karras, Tom Karras
Email version (Word Doc) available at senecare@aol.com by request

1.) OVERVIEW OF THIS BOOK

This on-line book has been designed to allow children and adult viewers to educate themselves about our Earth and its environment by easily selecting "hyperlinks" imbedded within the text to quickly view samples and illustrations about various science, engineering, and math topics. It is meant to be both educational and fun and introduces various on-line topics which sometimes are time consuming to search for these "hyperlinks"; they are already imbedded within this book to educate the readers on how the internet has become a great learning tool. The authors are first, second, and third generation family members and have enjoyed working together on this book. The authors have no intention of advertising for or supporting any of the websites which may come up within this book and are not affiliated or associated with any vendor and cannot guarantee that these websites and links will be operational at all times. **Comments, corrections, and suggestions are welcomed at above email.** Some of the information in this book was obtained by viewing TV at Science, History, PBS, NGO, and NOVA.

Example 1: How have the Earth's continents drifted over many years? Click on the link below; after the link comes up, scroll down and view "Continental Drift". **Our Earth now has 2,600 earth quakes per day.** After viewing any other areas of interest just click upper left hand corner and return to this book and continue. <http://www.enchantedlearning.com/subjects/astronomy/planets/earth/Continents.shtml> (1)

Example 2: How to use a calculator on the internet to find a mathematical computation such as, "What is the square root of a number?" The square root of a number is that number, say 16, which when multiplied by 16 is 256. To find the square root of the number 256, go to: www.calculator.com (37) , Note: click on Link, when the calculators link comes up, select one of the "Fractions Calculator", and place the mouse on blue numbers 2, 5, 6, and select the "square root symbol". You will find that the answer is 16, that is, 16 times 16 are 256. After using the on line calculator, click back, left top corner, to return to this online book and continue.

Example 3: Where are some of the major Earth Volcanoes? **Earth has over 1,600 active Volcanoes** with about 20 eruptions daily, View: <http://www.bing.com/images/search?q=volcanoes&qvpt=volcanoes&FORM=IGRE>

Example 4: Watch the planets as they orbit the sun at: <http://mistupid.com/astronomy/orbits.htm> (48)

Example 5: How many earths fit into the sun? (Note: this is computed later in Fig. 9) View link: <http://www.co-intelligence.org/newsletter/comparisons.html>

So, as one views this book, all illustrations will be found by clicking on each embedded link and after viewing information on the link, then just click back and return to this book. This reduces the costs of providing illustrations within the book, reduces costly book preparations, and at the same time provides the reader more information to review on the internet on related topics and is updated for all viewers.

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2.) OVERVIEW OF THE BIG BANG THEORY TO THE FORMATION OF OUR SOLAR SYSTEM p3

Ground telescopes and Hubble: <http://hubblesite.org/> (64) are like time machines looking deep into space. When they look back about 13.7 billion years nothing exists except a small heavy point which had exploded and is believed by most scientists to be the beginning of forming our current Universe. Who knows? Our universe may have begun from the inside of a large black hole from another galaxy/universe? View: <http://www.pbs.org/deepspace/timeline/index.html> (4)

View the WMAP Satellite photo of the "baby Universe" about 13.6996 billion years ago: http://it.wikipedia.org/wiki/File:Baby_Universe.jpg

Elements, dust, and clouds of matter began to form, large hot objects began to clump together (accretion process), then galaxies, stars, and planets followed.

View: http://en.wikipedia.org/wiki/Accretion_theory : Today there are many billion billions of stars and over 125 billion galaxies in the Universe. Our Milky Way is just one galaxy with billions of stars and it is just hard to envision the size of our Universe. It is said that there are as many stars in the Universe as there are grains of sand in all of the earth's coastal regions. "Red shifting-Doppler effect" of moving galaxies indicates continue expansion; stars and galaxies continue to be produced and explode. Our solar system with eight planets and many moons, millions of asteroids and comets, and the Oort cloud is over 4.5 billion years old. When our solar system was being formed, there were many planet type objects orbiting the sun; several times they collided and combined to form larger planets. During this accretion process the hot and heavy elements such as iron go to the center to form the center core which begins the magnetic field preparation. It has been stated that the earth was formed by collisions with several mini-planets; sometime after that, a planet in a similar orbit as the earth collided with the earth at a perfect angle and resulted in producing our current Moon. The moon has helped to stabilize our earth's climate, i.e. allows earth to have a South and North Pole and near stable spin axis; without the earth's moon, the earth's climate would be very unstable and variable to say the least. View accretion disk in this website: <http://www.daviddarling.info/encyclopedia/A/accretiond.html> (7)

The moon rotates about its axis about once per month and orbits the earth about once per month, it is "locked with the earth's rotation" and we always see the same side of the moon; we see the Sun's reflections monthly for the different phases of the moon: full and partial phases.

Our older Earth from 4.5 to 3.5 billion years ago was very active. It has been stated, from the projections of the number of craters on the moon, that there must have been over 100 large sized asteroids and comets which impacted the earth. Projections indicate that the earth had about 25 times more impacts than the moon. **If two asteroids collide (undetected) in the Asteroid Belt or a comet is deflected by Jupiter and heads to earth, we may only have about 6 months to take appropriate action!** Over 200 million years ago, a 62 mile long asteroid impacted in Quebec, Canada and could have caused a

mass extinction. See: <http://www.solarviews.com/eng/tercrate.htm> : The p4 debris, from the impact forces, could have circled the Earth and would have affected many plants, sea life, or land animals and could have lasted for hundreds of years. Some fossil forms of plants and other life have been found in Greenland and in the salt mines of Africa in this time frame to “carbon date” the event. The heat from the impact would have vaporized the ocean and lake waters and due to the earth’s gravity, water would have stayed in the atmosphere. Eventually, rains and storms would begin to build up the earth’s oceans and lakes. This process would repeat many times during this early earth period. Most of the other many impacts would re-cycle from near mass extinctions to a habitable planet. Many of the other impact areas are no longer visible and would have combined and mixed with the earth’s hot layers and mostly oceans and hence are difficult to find. This cycle of asteroid and comet impacts continued for some time until accretion and impacts became less frequent allowing the earth to cool down to support the initial forms of life.

Due to the earth’s tilt, we have four seasons. Note: In 2010 NASA spacecraft (Named WISE) discovered that a 300 yard asteroid is sharing Earth’s orbit, orbiting ahead by about 1/8 to ¼ of an orbit. Also our Milky Way galaxy is currently on a collision course with the Andromeda galaxy; both galaxies could collide and eventually merge as one larger spherical galaxy in about 3 billion years, view: http://www.nasa.gov/audience/forstudents/5-8/features/F_When_Gallaxies_Collide.html.

During the first 500 to 600 million years when Earth was undergoing heavy bombardment and excessive activity, it is very possible that Mars had cooled down enough and had the conditions to support life. Scientists have examined rocks and materials from Mars and concluded that Mars originally had a magnetic field, water on the surface, and an atmosphere; then it quickly shut down, lost its magnetic field which protected it from Sun’s radiation and lost its atmosphere (due to comets, gamma ray bursts, etc.?). We will know more about Mars after 2030 when the U.S. is expected to send astronauts there for exploration; we predict that beneath Mars surface they will find forms of fossil life and micro life.

Gamma Ray bursts from Stars (Supernova) was first observed around 1854 by the Chinese Astronomers; they now appear to be occurring daily. Note: There are over 200 moons orbiting the 8 planets in our Solar System (Mars has 2 moons); Page 35 has a brief discussion about Moons. View Animation of our Solar System showing moons at: http://dd.dynamicdiagrams.com/wp-content/uploads/2011/01/orrery_2006.swf .

3.) OUR SOLAR SYSTEM AND THE MILKY WAY GALAXY

Our solar system lies about two thirds distance from the center of our Milky Way galaxy. A simple scale size model would be like one holding a “baseball” in your hand to represent our solar system (Sun, Planets, etc.) in Germantown, Maryland, then the Milky Way Galaxy would be larger than the size of the United States. Our Milky Way galaxy contains over 200 billion stars! Although this scale model is not exact, it provides the reader with an idea of the size of our Solar System (Planets, Sun, etc.) relative to our Milky Way Galaxy. There are about 125 billion of other galaxies in our Universe and this amount of mass is hard to comprehend. Review Milky Way Galaxy at: <http://cass.ucsd.edu/public/tutorial/MW.html> (65),

<http://maps.nationalgeographic.com/maps/print-collection/milky-way.html> p5

This website provides a good view of our Milky Way, zoom/view our Solar System.

Note: Surrounding our Solar System is a large spherical “icy cloud” called the “Oort Cloud”.

The mass of our Sun is over 99% of the mass of our Solar System with its four rocky planets (Mercury, Venus, Earth, and Mars), the Asteroid Belt next and then four 4 larger planets (gas giants, Jupiter and Saturn) followed by the icy-gas giants of Uranus and Neptune followed by the Kuiper Belt (where Pluto and icy Comets are orbiting) and all surrounded by the Oort Cloud. A simple scaled model to approximate the size and distance of our Solar System would be to place a “basketball at home plate in a baseball stadium to represent our Sun”, and between home plate and pitcher’s mound place a “flower seed to represent planet Mercury”, between pitcher’s mound and second base place a “small pea to represent planet Venus”, at second base place a “larger size pea to represent planet Earth”, half way between second base and the home run area “place a grape seed to represent planet Mars”, and let the surrounding stadium seats represent the “Asteroid belt” filled “with millions of small flower seeds to represent all of the Asteroids”. Then, outside the baseball stadium beyond the parking lot, place “a golf ball to represent planet Jupiter”, “several more blocks away place a ping pong ball to represent Saturn“, and several more blocks away for each, place “marbles to represent planet Uranus and then Neptune”, and about 10 blocks further away place “millions of small flower seeds” surrounding the area of the baseball stadium to “represent Pluto and millions of comets, etc. in the Kuiper Belt”. Although this scale model is not exact, it is provided to allow the readers to try to visualize the enormous relative sizes and distance of our solar system for the Sun, planets, asteroids, and comets. Approximately 50 moons will fit into earth and 1,300,000 earths into the sun. View Solar System Overview: <http://science.nationalgeographic.com/science/space/solar-system> (66) and view planet comparisons at: <http://www.freemars.org/jeff/planets/planets5.htm> and http://galileoandstein.physics.virginia.edu/more_stuff/flashlets/kepler6.htm (47) This website shows Kepler’s Laws for orbits, practice the effects of gravity.

Note: Light from the Sun takes about one year to reach the Oort cloud or about 6 Trillion miles away; about 100 blocks to the basketball above .

Light travels about 6 Trillion miles in one year which represents one light year; our nearest star is about 4 light years away and a spacecraft leaving earth at 10% the speed of light would take about 40 years, referenced to earth time, to arrive at the star. It takes sunlight about 8.33 minutes to reach the earth after it leaves the Sun and light rays over 25,000 years to reach the Earth from the center of our Milky Way Galaxy. Light travels at 186,000 miles per second, so one could easily compute the distance to our Sun which is about 93 million miles. The Sun is very

close to Earth when compared to the center of our Milky Way Galaxy. It has recently been concluded by the scientific community that the center of most galaxies contains a large black hole which is very massive and contains high forces of gravity pulling in just about anything which goes close to the edges of the black hole called the “event-horizon”. Deep inside the black hole at the bottom is called the “singularity point-area or small circle”. The gravity force of the black hole is so intense that not even light can escape. When the temperature and pressures reach high levels, an explosion occurs, debris, radiation, particles, etc. are ejected and new stars and galaxies are formed. Our current Universe continues to expand and grow. The black hole in the center of the Milky Way is about 4 Million times more massive than our Sun and is about 10 thousand times larger. Note: Black holes are formed when large Stars expand and explode and due to gravity and less pressure, fallback (implode) and become massive. The Universe is large with a radius about 13.7 billion times 6 trillion miles or about $13.7 \times 10^9 \times 6 \times 10^{12}$ or about 1.6×10^{23} miles. The U.S. has several new satellites in orbit (i.e. Kepler and Spitzer) and more planned (SIM, Planet Finder, James Webb Telescope, etc.) to search for Earth-Like Planets or Moons in our Milky Way; the authors predict that several will be found which have a magnetic field, atmosphere, and the climate conditions to support life and will be visited (unmanned) within this century when we will be able to travel faster and further in space with Ion/nuclear engines, magneto-plasma, Solar Wind, and others as they are developed. Note: Large ground based telescopes and NASA spacecraft's (Hubble and Kepler) have found (as of Nov 30, 2011) **over 1,200 NEW planets in our 12 billion year old Milky Way Galaxy** and many more soon. The U.S. has been sending radio waves/messages for 50 years; it will take 25,000 years for them to reach the center of the Milky Way Galaxy.

4.) OVERVIEW OF OUR EARTH IN THE LAST 3.5 BILLION YEARS

About one billion years ago when the Earth was about 3.5 billion years old, it is stated that the earth began to cool down. While it was very hot on the surface, the earth's gravity kept the vaporized water from escaping the atmosphere. As the earth began to cool down, the water/rain began to cover the earth's surface. It was a green earth at first due to the water mixing with various forms of metals. Since water was probably available on the earth since its formation, asteroid and comet impacts brought more water and initially the earth's surface was almost completely covered with water. The heavy radioactive elements near the center of the earth kept the center of the earth's core very hot but the surface was beginning to cool and the earth was said to be a “green planet” instead of “blue planet” at this time due to the color of the surface water. View early earth: <http://ngm.nationalgeographic.com/2006/12/early-earth/video-interactive> (14), Near asteroids (click, select What): <http://users.tricity.wsu.edu/~hudson/Research/Asteroids/index.htm>
3.4 Billion years ago: Volcanoes began to erupt in Southern Africa and formed land and mountains. The African continent began to form as part of the earth's crust. One by one other continent's began to form due to volcanic action. p6

3.3 Billion years ago: Stromatolites (micro organisms) were found around the beaches of the continents and were said to have begun producing oxygen by Photosynthesis as well as micro's in our Oceans. The earth's water was now turning an "orange color" due to iron and oxygen reactions (oxygenation).

2.5 Billion years ago: The stromatolites and sunlight reactions were producing oxygen. Forms of life both under the ocean and above the land were beginning to take place and the organisms were the building blocks of life for both plants and animals. The oxygen levels began to rise and oxygen began to replace the carbon dioxide (caused by volcanogenic action) in the atmosphere and in the oceans. The continents had grown larger but were still separated by oceans of water and it appears that the first "snow ball earth" soon occurred with lots of methane gases.

1.5 Billion years ago: Lava was produced when the earth's internal heated molded rock and its heavy flow and circulation began. As the lava pushed upward it opened /separated the earth's crust and the downward movements of the hot molded materials began to cause the earth's crust to close together, then plate tectonics began. The internal circulation patterns of the hot molten materials then formed large cracks and caused all of the continents to eventually collide and merge as one large section above the oceans. Ocean life, land life, plants and water life began to flourish as oxygen levels in the oceans and on and above the land began to increase; the oceans and sky were turning to blue colors.

700 Million years ago: Due to the heavy volcanic actions and plate tectonic motions, ash clouds began to form in the atmosphere blocking the sunlight and cooling the earth. The Polar Regions began to enlarge and eventually the earth became a "snow ball earth" again. The result was mass extinctions of plants, animals, and sea life on the Earth's surface and in most cases under the oceans.

650 Million years ago: Again, thanks to the internal heat of the earth and the heavy pressures, older cracks under the sea and earth's crust, and heavy volcanic actions "saved the day" and began to melt the large ice sheets and produced a greenhouse effect again. After millions of years the cycle repeated itself as in the above paragraphs and the continents began to split apart.

500 Million years ago: High oxygen levels returned and forms of life began again.

450 Million years ago: A gamma ray burst may have destroyed life again on Earth.

400 Million years ago: Ozone layers formed above the earth to block out the UV rays and oxygen levels began to reach today's levels. Plant and sea life began to form again.

300 Million years ago: Due to tectonic plate motions and continued volcanic eruptions, the landmass combined again to form several large land masses and tall mountain ridges due to the crashing and buckling of two or more tectonic plates. Note: Due to the decay of plant life, temperature changes and pressure changes, the carbon materials decaying in fresh waters produced large quantities of fossil fuels such as coal on land and oil and gas under the oceans.

250 Million years ago: With possibly an Asteroid and the Siberia volcanic actions of hot and heavy materials on the earth's surface and clouds of ashes caused mass extinctions again, and resulted in the loss of about 95% of all plant and ocean life. http://kids.earth.nasa.gov/archive/pangaea/Pangaea_game.html (2)

240 Million years ago: After the "dust settled" and the oxygen and carbon dioxide levels began to rise, ocean and land life formed again, this time larger due to the higher oxygen levels. Thus began the "Dinosaur Age". View (3) below: <http://www.enchantedlearning.com/subjects/dinosaurs/glossary/Contdrift.shtml>

180 Million years ago: Again, due to the continual heavy volcanic eruptions and tectonic plate motions, the continents began to separate again, carrying dinosaurs, etc. with them. Dinosaur bones are found in all continents. Also, lots of gold and diamonds were produced underground from the very hot Volcanoes.

100 Million years ago: Due to the high level of oxygen and large growth of plants available to feed the dinosaurs, etc., the dinosaurs grew even larger.

65 Million years ago: Due to a large asteroid (about 6 miles long) landing off the east coast of Mexico and a large volcanic action taking place about the same time in India, the earth had another mass extinction which killed off most of the large animals on the surface of the earth. Is it possible that the asteroid impact force was transferred through the earth and caused the India volcanic eruption?

Note: This 6 mile asteroid is said to be over one million times more powerful than the atomic bombs dropped over Japan.

55 Million years ago: The India and Asia tectonic plates collided to form the Himalaya Mountains; India moved North like it was on a "conveyor belt".

35 Million years ago: A large asteroid crashed into the Chesapeake Bay Area. p8

2 Million years ago: After many millions of years, of the “dust settling again”, mammals, ocean, and land life began to arrive due to evolutionary and mating processes. Humans may have first developed in Africa and spread from continent to continent and had to deal with several more Ice Ages, Volcanic Eruptions, Asteroids Impacts, etc. During ice ages, large glaciers advanced and ocean levels lowered, land/coastal areas increased; during global warming glaciers melted and coastal land was lost: <http://www.divediscover.who.edu/iceage/timeline.html> Earth currently has 7 continents, almost 200 countries, and about 7 Billion people.

SUMMARY STATEMENTS:

VOLCANOES CAN FORM UNDER OCEANS OR ON LAND. VOLCANOES CAN CAUSE LAND BUILDUP REACHING ABOVE THE OCEANS NEAR FAULT LINES/INTERSECTING TECTONIC PLATES SUCH AS HAWIAN ISLANDS, NEW ZELAND, ICELAND, AND MANY OTHERS.

MOUNTAINS WERE FORMED FROM CRASHING/BUCKELING OF TECTONIC PLATES (i.e. APPALACHIANS AND HIMALAYAS, ETC.) AND FROM VERY LARGE/TALL MOVING ICE SHEETS SCRAPING UP THE GROUND DURING ICE AGES (i.e. GRAND CANYON).

VOLCANOES CAN CAUSE GLOBAL COOLING WITH VOLCANIC ASHES BLOCKING THE SUN, RESULTING IN MAJOR PROBLEMS, i.e. YEAR WITHOUT A SUMMER IN THE NORTHERN HEMISPHERE AROUND YEAR 1815. HURRICANES CAN PRODUCE TORNADOES.

VOLCANOES CAN CAUSE GLOBAL WARMING WHICH RESTORES LIFE DURING ICE AGES AND COULD ALSO AFFECT LIVING CONDITIONS i.e. LITTLE ICE AGE IN EUROPE ABOUT YEARS 1350 TO 1820

EARTH'S INNER LAYERS ARE STILL HOT AND CAN CAUSE VOLCANIC ACTIONS, INDUCE TECTONIC PLATE MOTIONS, AND IGNITE COAL UNDER GROUND WHICH RELEASES METHANE GASES IN THE ATMOSPHERE

EARTHQUAKES CAN EXCITE VOLCANOES AND VOLCANOES CAN EXCITE EARTHQUAKES. EARTHQUAKES AND VOLCANOES CAN CAUSE HYDROLOGIC “GRAVITY-WATER WAVES” (TSUNAMIS) WHICH COULD AFFECT LIVING CONDITIONS NEAR COASTAL AREAS

IN 1908, A COMET CHANGED TO A STONEY ASTEROID WAS THOUGHT TO HAVE EXPLODED IN THE SKY ABOVE THE EARTH OVER TUNGUSTGA, SIBERIA, RUSSIA IN A NON-POPULATED AREA; IF THAT OBJECT WOULD HAVE EXPLODED OVER NEW YORK CITY, THE ENTIRE CITY WOULD HAVE BEEN DESTROYED. About 13,000 years ago a 3 mile wide asteroid/comet may have exploded over the U.S. and destroyed most of life, humans, plants, etc. and could have resulted in causing global problems within several days affecting the earth's climate and lasted for many years.

SOME METEORITES WHICH CRASHED ON EARTH BROUGHT “LIFE SEEDS” WHICH HAVE THE “RIGHT STUFF TO GROW LIFE” IF THE CONDITIONS ARE RIGHT. Earth rotates at the equator about 1,040 miles/hr and orbits the Sun about 66,600 miles/hr.

DAMS/RESERVOIRS CAN TRIGGER EARTHQUAKES/TSNAMIS AND CAUSE LANDSLIDES PENDING WATER PRESSURE AND STABILTY OF THE SURROUNDING LAND. ALSO, EXPLOSIONS FROM MINING OPERATIONS CAN TRIGGER EARTHQUAKES AS WATER AND SOIL MOVE UNDERGROUND, I.E. SOUTHEAST AUSTRALIA.

LARGE METHANE HYDRATES CRYSTAL BALLS CAN FORM UNDER THE OCEAN DURING ICE AGES AND UNDER HIGH PRESSURES EXPLODE LIKE VOLCANOES AND ASSIST IN GLOBAL WARMING. HURRICANES CAN PRODUCE TORNADOES.

OXYGEN IS MAINLY PRODUCED ON EARTH FROM INTERACTIONS OF THE SUN'S ENERGY AND CARBON DIOXIDE AND WATER WITH: 1.) ORGANISMS IN THE OCEANS, AND 2.) PLANTS AND TREES ON LAND.

THE SOUTH POLE ROTATION IS THE “ENGINE” WHICH CREATES THE EARTH'S CIRCULATION FOR THE OCEAN CONVEYOR BELTS.

ASTEROIDS WHICH MISS CRASHING INTO EARTH COULD EITHER: 1.) PASS ON THRU OUR SOLAR SYSTEM, 2.) DUE TO EARTH'S GRAVITY COULD BE TOSSED OUT INTO OUTER SPACE (LIKE THE ONE JUNE 27, 2011), 3.) COULD BE “CAPTURED” BY THE EARTH'S GRAVITY AND ORBIT AS OUR SECOND MOON UNTIL IT EITHER BURNS UP IN OUR ATMOSPHERE OR CRASHES INTO OUR EARTH.

In each of the three cases above, an asteroid could possibly damage earth orbiting-satellites and/or the International Space Station. There are over 600,00 objects (19,000 tracked by NORAD) orbiting earth about 40 to 22,000 miles of new and old satellites, pieces of space junk, etc. http://en.wikipedia.org/wiki/Space_debris . Note: There are about 10 times more Volcanoes on Venus than on earth. Venus, the hottest greenhouse planet, has mostly rivers of hot lava instead of water; Venus's rain is sulfuric acid instead of water like on earth. p9

5.) EARTH'S MAGNETIC FIELD

When the earth was first formed over 4.5 billion years ago, heavy hot materials such as iron and nickel, radioactive elements, etc. settled near the center of the earth. It took many years for the earth's surface to cool down to what it is today, but the inner parts of the earth remain very hot and active, heated by various radioactive materials. The earth is an "active planet" and Moon, Mars, and Venus have mostly inactive magnetic fields. Venus' very slow spin is probably the reason, and Mars does not appear to have an active hot inner core but has some irregular magnetic areas; the Moon has a very weak magnetic field.

Most scientists believe that the Moon was originally formed as a planet in a similar orbit as the earth's orbit and collided with the earth. After many years it became the earth's moon, causing the earth to tilt about 23 degrees from the Sun-Earth elliptic plane. The moon has stabilized the earth's orbital spin system. Without the moon, the earth would just spin at random and might not have ice caps. Due to the gravity of the Sun and Moon, the earth precesses and wobbles as it orbits the Sun. The precession rate is about one degree per 72 years which results in a full cycle of about 26,000 years. Some scientists, including the authors, believe that this has a big effect on global warming and the last ten or so ice ages. The last ice-age problem ended about 14,000 years ago. Watch sun, moon, and earth at: <http://library.thinkquest.org/29033/begin/earthsunmoon.htm> (27)

As the earth spins (west to east) and rotates and reacts with the Sun's magnetic fields, etc. the hot liquid parts of the earth's inner core excite the electrons and produce convection currents, which in turn, produce circulating columns of convection currents (generator action will be discussed in Appendix, Part 3), which then generates most of the earth's magnetic fields. The combined effect of this motor turning action and generator action is called the "Dynamo Effect".

The Geographic North pole is currently the magnetic South pole tilted about 11 degrees from the vertical alignment of the earth. So the North Pole of the compass needle points to the current North Pole of the earth since unlike magnetic poles attract. There have been about 171 magnetic pole reversals in the last 71 million years as found from evaluating the imbedded "magnetic fossils" around the earth at different layers of the earth's crust. The last magnetic field pole reversal was over 750,000 years ago. We do not yet know what effects this will have on earth and the environment when the next reversal occurs; p10

there are now signs that certain areas around the earth have no magnetic fields and some areas have already begun to have reversals. The earth's magnetic field strength has decreased by about 10% and appears to be heading for another reversal. <http://hyperphysics.phy-astr.gsu.edu/hbase/magnetic/magearth.html> (15). The earth's magnetic field shields and protects the earth, humans, power systems, etc. from solar activity and outer space cosmic radiation by deflecting, interacting, and blocking of the particles and solar flares, etc. During the next magnetic field reversal, for some time we may not have a strong enough magnetic field for protection until the reversal stabilizes. Now when some satellites fly over certain areas of the earth, they are powered down to minimize spacecraft system and component damage (i.e. South America anomaly where the earth's magnetic field is diminished in Space near satellite orbits, allowing protons, etc. to affect S/C instruments). Gamma rays and x-rays from extreme solar activity can wipe out a multi-million spacecraft and shut down electric power grids; humans, animals, and birds, etc. could be impacted and volcanic eruptions could also affect the magnetic field system and excite or be excited by earthquakes. <http://csep10.phys.utk.edu/astr161/lect/earth/magnetic.html> (17)

The inner solid core of the earth is about 4,300 degrees centigrade, made mostly of iron and is about the size of our Moon. The outer core is about 3,700 degrees centigrade, mainly of liquid iron and is about the size of Mars. The mantle is solid to plastic and is about 1,000 degrees centigrade, containing various types of elements; heat from radioactive decay of some of the elements supplies the heat to the inside of the earth. The earth's crust is about 20 miles thick and there are 14 large ocean and land plates which are in constant motion. Some ocean plates move under the land plates and move lots of water down into the outer earth's core. It has been stated that more water is under the earth's crust than exists above the earth's crusts in all of the earth oceans. Due to the earth's crusts being brittle and the continuous moving of the earth's plates, friction between adjacent plates could ignite the hot liquid, gases, and magma sending hot lava and acid gases, etc. up to the earth's top layers and could result in volcanic activity emptying lava, gases, and hot ashes into our atmosphere and onto our land. <http://scign.jpl.nasa.gov/learn/plate1.htm> (16) and (53) below: <http://www.enchantedlearning.com/subjects/astronomy/planets/earth/Magnetosphere.shtml>

The Bermuda Triangle (south east of Florida) and the Dragon Triangle (south east of Japan) have exhibit very strange magnetic anomalies in the past and since they are at opposite ends of the earth, who knows?, they may be some way connected internally inside the earth.

6.) VOLCANOES

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Most of the active volcanoes can be found near the cracks or interface points along the edges of the tectonic plates and many are still active both on land and under the oceans. View the website below:

<http://www.bing.com/images/search?q=volcanoes&FORM=IGRE&qvpt=volcanoes#> (32)

The inner core heats the rocks below the surface of the earth into hot molten magma many miles below the surface which rises and as gas pressures build up can lead to an eruption of the volcano. When it erupts, either hot lava and/or volcanic ashes could be ejected and could result in major problems to the environment, climate, and even loss of life. There are volcanoes which have for years been covered with heavy ice and when the ice melts, the volcano could begin to grow and become more active. Volcanoes can be either active, dormant (expected to go active in the near future), or could become extinct (have no sign of erupting again). View: <http://www.crystalinks.com/rof.html> (13). Also view the Ring of Fire Volcanoes located in the Pacific Area: <http://www.worldatlas.com/aatlas/infopage/ringfire.htm> . Over the past many years, several volcanoes have erupted and could have caused mass extinctions of plants, animals, and sea life. Several have caused damage to the surrounding homes and property and even resulted in loss of life. However volcanic eruptions can be a good thing for during several past ice ages they melted the ice and restarted the earth's plant and animal life cycle. The Krakatau's Volcano in Indonesia has erupted several times and has caused a major impact in the surrounding areas and resulted in loss of life and displacement of humans. In 2010 when an Iceland Volcano erupted and threw tons of ash into the clouds, many surrounding airports had to shut down since the ashes can stop the airplanes jet engines. View various Volcanoes, etc. at: http://standeyo.com/Geo_Solar/Geophysics.html#Oceanographic .

When the inner earth heats up, water under volcano and hot steam (geysers) can be formed due to high pressures underground, such as found in Yellowstone National Park in Wyoming. Geothermal steam and hot water are potential power sources to turn turbines/generators. Iceland sits on top of an active volcano in the Atlantic Ridge. Much of the land masses were formed by volcanoes and continue today. http://www.geology.sdsu.edu/how_volcanoes_work/ (11)

Volcanoes can sometimes erupt and blow out sides of their mountains which could slide into towns or nearby oceans causing ocean waves to move outward producing large gravity waves called tsunamis. Tsunami waves travel several hundreds of miles per hour and can cause major problems in nearby coastal areas and even travel thousands of miles away across oceans, i.e. from Africa to the U.S.

7.) EARTHQUAKES AND WATER-GRAVITY WAVES (TSUNAMIES) p13

Like volcanoes, many earthquakes can occur near the cracks (fault lines) of the tectonic plates and even as deep as ten miles in the ocean. As the plates move against each other or move over or under each other, forces/pressure can buildup and quickly release lots of pressure and cause rock/ground forces to move earth materials resulting in major property damages and even major loss of life. The Richter scale has been adopted to assign strength to earthquakes, i.e., one to ten, where one is lowest earthquake activity with ten being the highest and very dangerous to be in the area. The San Francisco earthquake in 1906 was assigned an 8.3 which caused major damage to buildings and killed

many humans. In 2010, in the Maryland-DC-VA area we had a 3.6 earthquake which did not cause any damage but scared a lot of people; the 5.8 earthquake in Aug. 23, 2011, caused minor damages in the East Coast, but there were no known deaths. The 2011 Japan earthquake was about 9.0 killing/relocating lots of people due to 95 foot tsunami waves.

Earthquakes can also cause tsunami waves similar to volcanoes as happened deep in the ocean ridges near Indonesia in 2004. The U.S. and other countries now monitor for both earthquakes and tsunamis. Shock waves generated by earthquakes are picked up and monitored by seismographs to estimate the amount of energy released by an earthquake. Many ocean buoys are placed in the oceans and monitor for vertical wave motions using satellites in an attempt to monitor and detect tsunamis. View 2011 Japan Earthquake/Tsunami photos: <http://www.abc.net.au/news/events/japan-quake-2011/beforeafter.htm>

It may be possible? that the earth's outer layers above the hot molten rock could contain chunks of "large magnetic rocks" near the cooler crust, like uncrushed lumps-of-potatoes in a mixing bowl while one is making "mashed potatoes". These chunks could act like magnetic force objects attacking/repelling each other as they swirl around and bang up against the earth's crust, causing some of the earthquakes. This theory is documented by one of the authors and has not yet been proven.

8.) AIRFLOW JET STREAMS AND OCEAN CURRENTS

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a.) AIRFLOW JET STREAMS

Our Sun's heat energy transforms some of its energy into wind energy and as the earth rotates and spins from West to East, it pulls and drags the air masses and Clouds and due to the high pressure near the North Pole, the winds are always in motion. Winds flow from high pressure to lower pressure areas and move eastward over the U.S. where two or three streams of separate Jet Airflows can occur at the same time. In the southern part of the U.S. , hot air and winds (during the summer season) move northward over Texas and Louisiana and when the lower eastward jet stream moves through the vertical air flow from the south, tornadoes can form over Texas to Kansas, and nearby areas.

View at: http://en.wikipedia.org/wiki/Jet_stream (25)

b.) OCEAN CURRENTS

The major ocean currents are in constant motion and are stirred up by the ocean conveyor belts. The warm water from the equator moves toward the north cold water, and since the cold water is heavier than warm water; the cold water travels under the oceans as the warm water travels near the top layers, producing the conveyor belt, see: <http://www.enviroliteracy.org/article.php/545.html> (23).

If global warming continues and glaciers melt, this could have a major impact on sea surface temperatures and the earth's environment. If the conveyor belt were to shut down near the glaciers, it could result in cooling northern regions and heating up the ocean's waters in the southern regions. This can increase hurricane strengths due to more warm water fueling the hurricanes. Heavy rains could then begin to wash out the carbon dioxide and other gases in the atmosphere. If the conveyor belt is shut down and air/ocean temperatures drop, glaciers increase in size, the huge white ice surface area reflects the sun's heat away from the earth (called the Albedo effect) and with lower levels of greenhouse gases in the atmosphere, the earth's temperature drops and the earth could go into another Ice Age in a very short time frame.

Note: Vortexes in jet streams near the Polar Regions during winter months like in 2010/2011 can really change winter weather patterns; also, "warm water ring" vortexes under the oceans, stirred up by the conveyor belts, can fuel hurricanes.

a.) TORNADOES

As discussed above, high winds in conjunction with clouds can cause the clouds to pull together. As the hot air rises from the bottom to the top of cloud layers, the clouds began to swirl and spin, the momentum increases (like a slow spinning ice skater bringing their arms in to spin faster) clouds get closer, tornadoes are formed. This same effect can cause “waterspouts” over large water areas. <http://goes.gsfc.nasa.gov/> (9). Tornadoes are rated by Fujita Scale from F0 to F6, with F6 being the worst. GOES(Geostationary Operational Environmental Satellites), in conjunction with the National Weather Service Radar Systems detect, locate, track, and monitor both tornadoes and hurricanes and attempt to predict their paths to alert the public to take proper precautions.

April 2011 was a record breaking month/year in the U.S. for tornadoes with over 700 resulting in billions of dollars in property damage and many lives were lost.

Note: Cosmic Rays/particles from outer space may be the major ignition force of lightning in our clouds and who knows? They could be a contributor to some of our migraine headaches.

b.) HURRICANES

The earth’s rotational speed is highest at the equator (about 1,040 miles per hour) and is lower in the Northern Hemisphere and this effect, called the Coriolis Effect, tends to produce counter clockwise air/cloud circulation. Most of the U.S. hurricanes are formed off the coast of Africa due to both the high westerly winds (called Trade Winds) coming off Africa and the high sea surface temperature in the summer months. Global sea surface temperatures have been rising over the past 50 years and this appears to have increased the number and size of hurricanes. Hurricanes (also called cyclones and typhoons) are rated from one to five categories. Higher number is more in strength than the preceding number. Hurricane Katrina was a category 5 which caused major damage in the Southern United States: view: <http://rsd.gsfc.nasa.gov/rsd/images/>.

Note: Planets Venus and Jupiter have hurricanes from hot winds and gases due to the Coriolis Effect. Venus may have micro life in clouds like those found on earth near hot springs and under the oceans. Venus rotates opposite of the other planets and was probably due to an earlier impact with other planets/asteroids. Saturn’s moon Titan has lakes of liquid methane gas. Our Solar System (Sun, Planets, etc) orbits the Milky Way Galaxy at about 500,000 miles per hour and it takes about 230 Million earth years to make one completed orbit of the galaxy. Our Sun is over 4.6 billion years old and rotates about once every 28 days with Solar Cycles about every 11 years: <http://en.wikipedia.org/wiki/Sun>

a.) **ASTEROID BELT:** There are millions of asteroids orbiting the Sun in orbits between Mars and Jupiter (called the Asteroid Belt). Thousands of larger asteroids are being monitored and cataloged and hundreds of them could be in near-earth crossing orbits, which are the current main concerns of earthlings. view: <http://neo.jpl.nasa.gov> : <http://neo.jpl.nasa.gov/nhats/> . There are about 500 even larger earth orbit- crossing asteroids currently identified and being monitored with many more to locate and monitor. A 900 foot Asteroid will pass within 20,000 miles of the Earth in 2029 and if that asteroid comes within a certain area(called keyhole, where earth's gravity changes the asteroids orbit for its next pass), then it would crash into the Earth in about 2036 during that orbit. Several methods of deflecting the asteroid are being studied such as: nuclear blasts, gravity pulling with heavy spacecraft, Sun-mirror-amplification burning of large holes in asteroid for jetting it away, etc. View: http://science.nasa.gov/science-news/science-at-nasa/2005/13may_2004mn4/ : A large comet (Shoemaker-Levy 9) crashed into Jupiter (took the hit instead of Earth) on July 16, 1994. The comet/asteroid was broken into about 21 large pieces by Jupiter's gravity force and its atmosphere, and was the first time earthlings viewed an object crashing into another planet. It was monitored by the Hubble Spacecraft as pieces began crashing into Jupiter. Also, the U.S. was the first to land a spacecraft (NEAR-Shoemaker) on an asteroid in 2001. Due to Jupiter's gravity affecting orbiting asteroids, they occasionally bump or collide into each other; then debris can be sent out at all angles from the collision impacts. In 2008, an asteroid(one too small to find with normal telescope searching), was spotted (about the size of a school bus) by an astronomer just looking out into space and noticed that this asteroid was only about 24 hours away from crashing into the earth. So the astronomer asked others to confirm his finding and they determined it would indeed strike the earth somewhere in a desert near Asia. It broke up into many pieces and school kids were assigned to walk in the desert for a couple of days, picking up about 20 small pieces of "meteorites" from the asteroid.

Note: In the near future, NASA is planning to put a satellite in orbit near planet Venus to look back on Earth to search for possible incoming asteroids or comets. In 1985 an asteroid missed the earth by about 15 minutes; the asteroid in 2011 missed the earth about 7 minutes.

View Astronomical Sites at: <http://standeyo.com/Astro/astronomical.html> . We may see an asteroid crash into Mars: <http://www.solstation.com/stars/ast2belt.gif>

b.) **COMETS:** There are millions of comets currently orbiting the Sun outside of planet Neptune near the region of Pluto (the Kuiper Belt) and the Oort Cloud. Comets are basically "ice like asteroids" and when they reach the vicinity of the Sun, we can see the water vapor melting from the comet due to the reflection of the sun light off the comets trailing areas, called the comet's tail which points

away from the sun. Haley's Comet takes about 76 years or so to make one orbit around the Sun. In 2005 two U.S. spacecraft were sent to a comet. Deep Impact sent a probe to impact the comet to study its orbit/composition, while Star Dust intercepted a comet and sent a capsule of collected dust and particles back to the earth for scientists to analyze. They discovered that microbes and other living materials were inside comets. Comets are believed to have brought much of the earth's water and may have brought the building blocks of life to earth i.e., "life seeds" (amino acids). Comets occasionally get pulled out of orbit, similar to the asteroids, and go into long elliptical orbits around the sun like Haley's Comet and Haley-Bop Comet. <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Comets> (67).

In 2015 a NASA spacecraft (named NEW HORIZON) will reach the Kuiper Belt to study the various Comets, Pluto, Eris, and other dwarf planets. NASA Rosetta Spacecraft will land on a comet around 2014. View comet orbiting our Sun: <http://www.ewart.org.uk/physics/index.php?l=61>

c.) General Comments: The earth receives over 25 tons of asteroid or comet debris daily and the earth continues to be reshaped and resized; they also bring to earth valuable resources such as water and minerals. Our earth is bombarded everyday with pieces of meteoroids (called meteorites when they hit the earth) along with one basketball size per week and one car size per six months. In addition, the earth is penetrated with cosmic rays, photon's (light particles from the Sun), UV rays, etc.; our atmosphere shields the earth from most of this stuff. At night one can see some of the asteroids (meteorites) burning up since they get very hot and breakup or dissolve by the time they reach the earth. Occasionally large pieces still manage to penetrate through the Earth's atmosphere. In early 2010, a basketball-size meteorite went through a house roof in Virginia. In about 2025, the U.S. may send astronauts to an asteroid to study it up closer, so that in the future, we might be able to determine the best way or methods to either destroy or deflect those asteroids which may be a threat to our earth. In July 2011, a NASA spacecraft named DAWN started to orbit around a large asteroid (350 miles wide) and later will be moved to orbit/study the largest asteroid.

11.) SOLAR FLARES AND SOLAR WINDS

The earth's outer magnetic fields protect humans from high solar activity and space radiation. Occasionally in high solar activity and when sun spots are in direct line of sight, highly charged particles and solar flares, etc. can penetrate the earth's magnetic field and damage power lines and energy systems, like in 1989. Astronauts must take cover and some critical components in satellites need to be turned off so they do not get damaged. Corona Mass Ejections (CME), like in 1859, are rare but are considered the most dangerous solar flare events which could grossly affect our earth; CME's are like EMP (electro-magnetic pulse) from exploding nuclear bombs and could damage earth's electronic computers, satellites, power systems, etc. Websites provide overview of our Sun's activity: <http://www.swpc.noaa.gov/primer/primer.html> (68); <http://solarscience.msfc.nasa.gov/SolarWind.shtml>(69) p17

12.) CLIMATE CONSIDERATIONS

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The earth has been warming over the past 50 years. Due to human produced air pollution, the ozone levels over the South Pole area getting thinner, allowing for more Ultra Violet sun rays to pass through. Carbon dioxide and other gas levels have increased due to our use of fossil fuels (coal burning, gas, and oil uses). These gases in the atmosphere are blocking the reflection of sunlight from the earth surfaces since reflections off the ice sheets and snow results in the earth warming, called the greenhouse effect. Some amount of greenhouse is good to prevent the earth from over cooling and becoming an Ice Age, so we need to try to keep a balance. By using more solar, wind, and nuclear power plants, we could help to balance this global warming process. Planting more trees and continuing to preserve the forest and parklands will help to absorb more carbon dioxide.

<http://breathingearth.net/> (40); <http://www.pbs.org/wgbh/nova/warnings/stories/nojs.html> (44)

It appears from recent research efforts that the carbon dioxide in the ice, in the polar ice regions, during ice melting phases may be raising in the atmosphere instead of dropping in the oceans to produce oxygen; this will increase the Green House Global Warming problem, and this also could affect the Ocean Conveyor belt system. Materials will soon be made which will absorb lots of carbon dioxide from the atmosphere. View current Threat Watch at: http://standeyo.com/Earth_Changes/Threat.Watch.html.

13.) EARTH ORBITING SATELLITES FOR GLOBAL MONITORING

The U.S. has many satellites in orbit for both research and operations to study our earth and its environment. They monitor our earth to provide early warnings in the advent of potential major problems. The U.S. has weather satellites in polar orbits and geostationary orbits (some 22,000 thousand miles above the U.S. area) and satellites positioned about 1.0 % of the distance between the Sun and Earth (L1 point) to monitor solar activity. In addition, U.S. satellites monitor sea surface temperatures, tectonic plate movements, heights of ocean waters for Tsunamis detection, volcanic mountain changes and many other environmental science data. <http://www.tsunami.noaa.gov/> (19) monitoring Tsunamis from satellites.

<http://www.noaa.gov/satellites.html>(70), satellite orbit monitor positions:

<http://www-spof.gsfc.nasa.gov/Education/wlagran.html> (71)

There are over 24 U.S. Global Positioning Satellites (GPS) orbiting the earth in various orbits to provide location information. The user has a GPS receiver which picks up at least three signal waves from four of the nearest GPS satellites and its computer stores the precise time of arrival of each of the signals. Using the orbit information of each satellite provides the user or system with its current location to a very high accuracy. The GPS platforms also monitor for all kinds of potential disasters. GPS systems are placed on sea buoys, tectonic plates and volcanoes to monitor their activity and on animals, birds, etc. to monitor their motions and environment, and on weather balloons to monitor environmental data, etc.

http://www.colorado.edu/geography/gcraft/notes/gps/gps_f.html (73)

14.) GODS SYSTEM –GLOBAL OPERATIONAL DISASTER SYTEM-
RECOMMENDATION TO IMPROVE HEALTH AND SAFETY

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The U.S., in agreement with other countries, should develop and operate about 9 Global Operational Disaster Systems located near or above the equator and separated by about 40 degrees east-west to cover the complete earth to provide quick reaction response to upcoming global disasters such as major volcanic eruptions, tsunamis, major earthquakes, major hurricanes, and major space debris such as the faulty earth orbiting satellite, recently shot down by the U.S. Navy. Smaller incoming asteroids could be tracked and shot down; larger asteroids and comets may need to be deflected by other means. It would seem to the authors that volcanic ash could be vacuumed and dispersed similar to the oil cleanup in the recent Gulf oil disaster. We need to be better prepared to cope with upcoming major disasters.

15.) NEAR FUTURE CONCERNS

The author's main concerns at this time is possibility of major earthquakes followed by tsunamis in the West Coast areas and Alaska and the possibility of high volcanic activity in the Yellowstone National Park area and other U.S. Northwest areas due to the current active status and past eruptions and earthquakes. Also the short term and long term effects of the next magnetic field reversal is of concern; the earth's magnetic field acts as a shield to protect us and we have no recent experience with magnetic field reversals. In 2012/13 the 11-year solar cycle may peak, the Sun may "eclipse" with the center of our galaxy (which occurs every 26,000 years or so); the electro-magnetic centers of the galaxy, sun, and earth will be in direct alignment. Our biggest concern should be the rising of the earth's temperature, which melts glaciers and results in rising sea levels. This could cause severe weather and flooding and could displace many humans living in or near coastal regions. Movements of sea water bouncing up and down over the tectonic plates could also excite earthquakes and activate volcanoes and affect the overall weather conditions and climate. **We need to improve on balancing the Earth's climate and prepare for disasters.**

APPENDIX (Part 1) – Information below will be helpful to Students p20
 “Dimensional Analysis” can be used in understanding equations

Example 1: If a car is moving at 60 miles per hour, find its rate in feet/sec.

$$\text{Want } \frac{\text{feet}}{\text{second}} > \frac{60 \text{ miles}}{\text{Hour}} = \frac{60 \text{ miles}}{\cancel{\text{hour}}} \times \frac{1 \cancel{\text{hour}}}{60 \text{ minutes}} = \frac{1 \text{ mile}}{\text{minute}}$$

$$\frac{1 \text{ mile}}{\text{minute}} = \frac{1 \cancel{\text{mile}}}{\cancel{\text{minute}}} \times \frac{5,280 \text{ feet}}{\cancel{\text{mile}}} \times \frac{1 \cancel{\text{minute}}}{60 \text{ seconds}} = \frac{5,280 \text{ feet}}{60 \text{ second}} = \frac{88 \text{ feet}}{\text{second}}$$

Example 2:

If a car is moving at 45 miles per hour, what distance will it travel in 2.5 hours?

$$\text{We want miles} > \frac{45 \text{ miles}}{\cancel{\text{hour}}} \times 2.5 \cancel{\text{hours}} = 112.5 \text{ miles}$$

in numerator

Example 3:

How much time will it take one to travel 90 miles at 45 miles per hour?

$$\text{We want hours} > \frac{1 \cancel{\text{hour}}}{45 \cancel{\text{miles}}} \times 90 \cancel{\text{miles}} = 2 \text{ hours}$$

In numerator

Example 4:

If a football player can run 100 yards in 9 seconds, what is the speed in miles per hour?

$$\text{want } \frac{\text{miles}}{\text{hour}} > \frac{100 \cancel{\text{yards}}}{9 \cancel{\text{seconds}}} \times \frac{1 \cancel{\text{mile}}}{5,280 \cancel{\text{feet}}} \times \frac{3 \cancel{\text{feet}}}{1 \cancel{\text{yard}}} \times \frac{60 \cancel{\text{seconds}}}{1 \cancel{\text{minute}}} \times \frac{60 \cancel{\text{minutes}}}{1 \cancel{\text{hour}}} =$$

$$\frac{100 \times 3 \times 60 \times 60 \text{ miles}}{9 \times 5,280 \text{ hour}} = 22.7 \text{ miles/hour}$$

Example 5: A 10 kilometer (10km) long asteroid, landing in the Gulf of Mexico Area about 65 million years ago, may have been responsible for killing off the Dinosaurs. How long was the asteroid in miles? Note: 1 meter = 39.37 inches.

$$10\text{km} = 10 \times 1000 \times \cancel{\text{meters}} \times \frac{39.37 \cancel{\text{inches}}}{1 \cancel{\text{meter}}} \times \frac{1 \cancel{\text{foot}}}{12 \cancel{\text{inches}}} \times \frac{1 \cancel{\text{mile}}}{5,280 \cancel{\text{feet}}} = 6.21 \text{ miles}$$

Example 6: Seventy two pints are how many gallons?

$$\text{Want gallons} > 72 \cancel{\text{pints}} \times \frac{1 \cancel{\text{quart}}}{2 \cancel{\text{pints}}} \times \frac{1 \cancel{\text{gallon}}}{4 \cancel{\text{quarts}}} = \frac{72 \cancel{\text{gallons}}}{2 \times 4} = 9 \text{ gallons}$$

A.) IF a football field is 48 yards wide and 100 yards long, approximately how many acres is the football field? Note: 1 acre is 43,560 sqft (approx 44,000)

$$\text{football field} = (48 \text{ yards} \times \frac{3 \text{ feet}}{\text{yard}} \times 100 \text{ yards} \times \frac{3 \text{ feet}}{\text{yard}})$$

$$= 48 \times 3 \text{ feet} \times 100 \times 3 \text{ feet} = 43,200 \text{ ftft} = 43,200 \text{ square ft}$$

$$\text{football field} = 43,200 \text{ ftft} \times \frac{1 \text{ acre}}{43,560 \text{ ftft}} = 0.992 \text{ acres or } \underline{\text{about 1 acre}}$$

So, the concept of the “size of an acre” is about the same size of the “playing area” of a football field!

B.) If a housing developer wanted to build houses on one acre of land and is permitted by the county to have 5,400 sqft lot sizes per home, how many homes can be built on one acre?

$$\frac{\text{Homes}}{\text{acre}} = \frac{\text{home}}{\text{lot}} \times \frac{\text{lot}}{5,400 \text{ ftft}} \times \frac{43,560 \text{ ftft}}{\text{acre}} = \underline{8 \text{ homes}}(\text{approx})$$

C.) How many acres in a square mile? We want acres/square mile, so:

$$\frac{\text{Acres}}{\text{Mile} \times \text{Mile}} > \frac{1 \text{ Acre}}{43,560 \text{ ft} \times \text{ft}} \times \frac{5,280 \text{ ft}}{\text{mile}} \times \frac{5,280 \text{ ft}}{\text{mile}} = \underline{640 \text{ Acres}} \text{ square mile}$$

See online calculators, metric, etc. at: www.metriccalculator.com (36)

VIEW A GREAT MATH-SCIENCE WEBSITE AT: www.khanacademy.org

SAMPLE WORD PROBLEMS

p22

A.) If a hamburger (H) and coke (C) costs \$1.40 for seniors and the hamburger costs \$1.00 MORE than the coke, how much did the coke cost? Note: 2 unknowns require 2 equations to solve this problem.

$$(1) H + C = 140 \quad \text{and} \quad (2) H = 100 + C, \quad \text{putting (2) into (1), yields}$$

$$(100 + C) + C = 140, \quad \text{then} \quad 2C + 100 = 140, \quad \text{then} \quad 2C = 40, \quad \text{or} \quad C = 20 \text{ cents}$$

and $H = 120$ cents from (2) $H = 100 + 20 = 120$ cents or \$1.20

Which indicates that the hamburger costs \$1.00 MORE than the coke, since the coke (C) costs 20 cents and the hamburger (H) costs \$1.20.

B.) When Grandfather's (G) age was four times Angela's (A) age and Angela's age was twice Leanne's (L) age, and their combined age was 99, what were their ages? Note: 3 unknowns require 3 equations to solve the problem.

$$(1) G = 4 \times A \quad (2) A = 2 \times L \quad (3) G + A + L = 99$$

$$\text{Putting (1) and (2) } L = A/2 \text{ into (3) yields } (4 \times A) + A + (A/2) = 99$$

$$\text{So, } 4A + A + A/2 = 5.5 A = 99, \quad \text{so } A = 18 \text{ years}$$

$$\text{From (1) } G = 4 \times 18 = 72 \text{ years and (2), } L = A/2 = 18/2 = 9 \text{ years}$$

Grandfather's age = 72 years, Angela's age = 18 years, and Leanne's age = 9 years

C.) I could not remember the equation to convert Fahrenheit degrees to Centigrade and vice versa but I remembered these three readings: 1.) when $F = 212$ degrees, $C = 100$ degrees, 2.) when $F = 32$ degrees, $C = 0$ degrees and 3.) and both are the same at -40 degrees (when $F = -40$ degrees, $C = -40$ degrees) and they have a "linear" relationship with each other., ie $y = m X + b$, so we do the following below: $F = m C + b$, 1.) $212 = m \times 100 + b$ 2.) $32 = 0 + b$ (so, $b = 32$), 3.) $-40 = -40m + 32$ (so, $m = 9/5$) Therefore, the conversion equations become $F = 9/5 C + 32$ and therefore $C = (F - 32) \times 5/9$ To view on-line graph, go to: www.webgraphing.com (38), at top select "graphing", then "graphing functions", then "Basic Calculator", at $y =$ "type in" $9/5x+32$, select "graph it", then type in $X_{\min} -50$ $x_{\max} 50$ $y_{\min} -50$ $y_{\max} 110$, scroll down and view graph. Use online calculator converter to check several conversions (39): <http://www.wbuf.noaa.gov/tempfc.htm>

Note: Problems opening Fig1 thru Fig11 ?, try: <http://www.kidsmathsciencedigitalbook.com/read.pdf>

Some Math Equality Concepts

Fig 2

Equality:

$$\frac{A}{\triangle} = \frac{B}{\triangle}$$

$$\frac{1}{2} A = \frac{1}{2} B$$

$$\frac{A - B}{\triangle} = \frac{B - B}{\triangle}$$

$$\frac{A}{\triangle} = \frac{B + C}{\triangle}$$

$$\frac{2}{3} (A) = \frac{2}{3} (B + C)$$

$$\frac{A - C}{\triangle} = \frac{B + C - C}{\triangle}$$

What you do to one side must also be done to the other side to keep balance or to preserve the equality.

Inequality:

A is greater than B

$$A > B$$

A is less than B

$$A < B$$

Factors: $\frac{x^2 + 7x + 12}{(x+4)} = \frac{(x+A)(x+B)}{(x+4)} = ?$

Visual solution: what 2 numbers A & B when multiplied together yield 12 and

When added together yield 7? First look at 12, possibilities are:

1 x 12, 2 x 6, and 3 x 4, therefore, by visual inspection, only 3 + 4 yields 7.

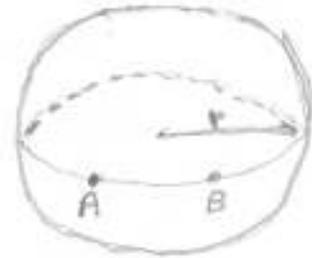
$$\frac{(x+3)(x+4)}{(x+4)} = x+3$$

SOME MATH CONCEPTS

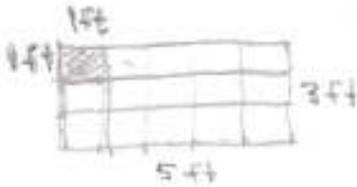
Fig 2

Point or Location A . or B.

Distance or Line/Curve A. ----- B .

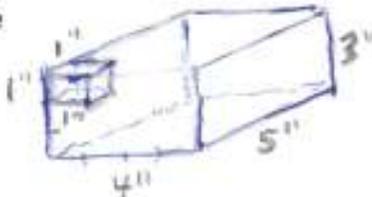


Area



15 square ft ("ft x ft") = 15 pieces of one foot square tile or carpet would be needed to cover the floor area

Volume



cubic inches ("inches x inches x inches") (like ice cubes)
 Total Volume = $3 \times 4 \times 5 = 60$ cubic inches
 or 60 ice cubes would fit into this box
 or contains 60 cubic inches of air volume

Example 1.) If one-square foot tile cost 25 cents each, how much would it cost to cover a room which is 18 feet by 12 feet? Note: requires 216 pieces of title.

$$\text{Ans: } \frac{18 \text{ feet} \times 12 \text{ feet}}{\text{room}} \times \frac{25 \text{ cents}}{\text{square foot}} = \frac{5400 \text{ cents}}{\text{room}} = \frac{\$54.00}{\text{room}}$$

$$\text{or } \frac{216 \text{ tiles}}{\text{room}} \times \frac{0.25 \text{ dollars}}{\text{tile}} = \frac{\$54.00}{\text{room}}$$

Example 2.) If an empty box with all sides being 1 foot (1 cubic foot box), how much in air space or how many one-inch ice cubes would fit into the box ?

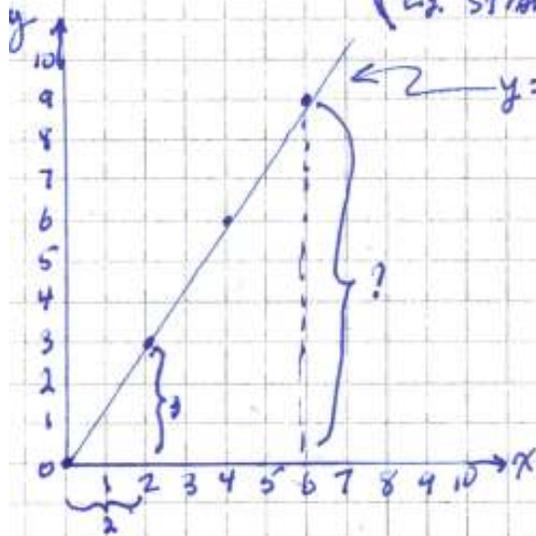
$$1 \text{ cubic foot} = \text{ftftft} = \frac{1 \text{ foot}}{\text{Foot}} \times \frac{12 \text{ inches}}{\text{foot}} \times \frac{1 \text{ foot}}{\text{foot}} \times \frac{12 \text{ inches}}{\text{foot}} \times \frac{1 \text{ foot}}{\text{foot}} \times \frac{12 \text{ inches}}{\text{foot}} =$$

$$\frac{12 \times 12 \times 12 \text{ cubic inches}}{\text{box}} = \frac{1,728 \text{ cubic inches of air}}{\text{box}} \text{ or holds } \frac{1,728 \text{ ice cubes.}}{\text{box}}$$

CONCEPT OF A "LINEAR SYSTEM"

Fig 3

(i.e. Straight Line $y = mx + b$)



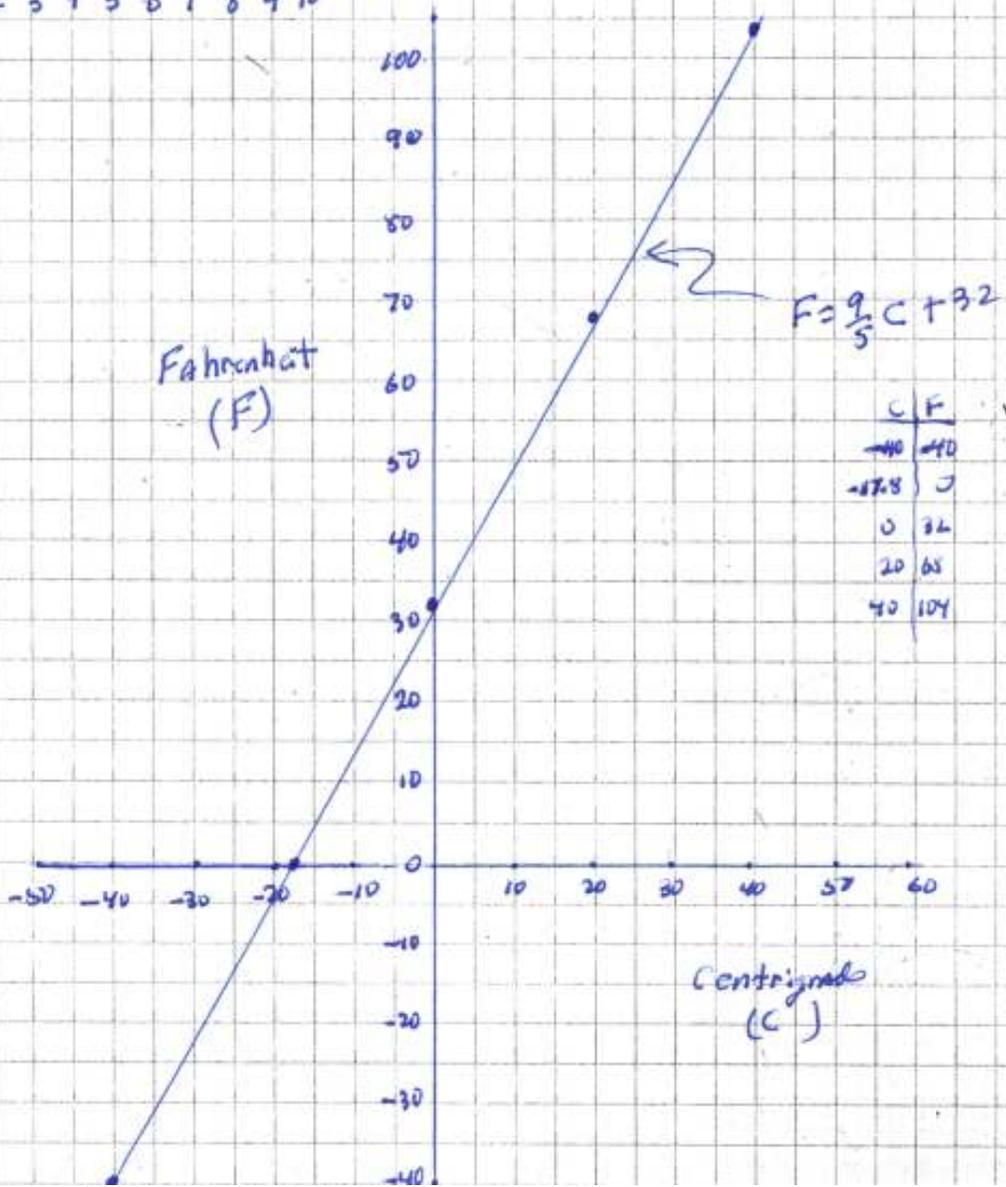
$y = \frac{3}{2}x$

x	y
0	0
2	3
4	6
6	9

$y = \frac{3}{2}x$, when $x = 6$
 $y = 9$

Proportions in Ratios
 $\frac{3}{2} = \frac{y}{6} \therefore y = 9$

Go to www.webgraphing.com for online graphing



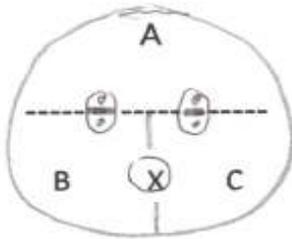
Fahrenheit (F)

$F = \frac{9}{5}C + 32$

C	F
-40	-40
-20	-4
0	32
20	68
40	104

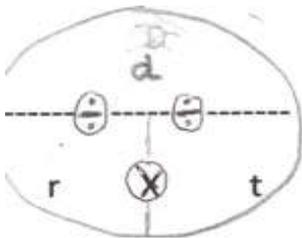
Celsius (C)

USING MATH CIRCLES TO ASSIST WITH EQUATIONS



$$A = B \times C \quad B = A/C \quad C = A/B$$

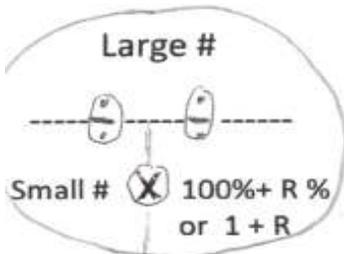
Note: To find an equation, cover up the item you want to find with your thumb, and perform the operation called for. ←



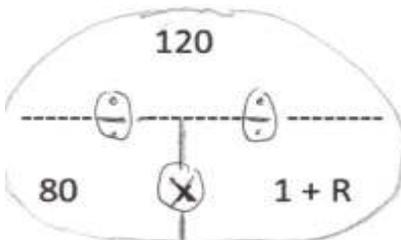
$$\text{distance} = \text{rate} \times \text{time} \quad d = r \times t$$

$$r = d/t \quad \text{or} \quad t = d/r$$

Gain or Appreciation

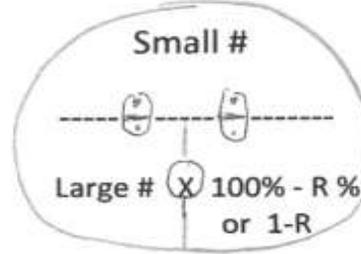


If a person's weight increased from 80 pounds to 120 pounds in 5 years, what was the percentage weight gain?

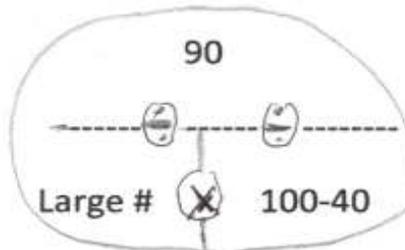


$$1 + R = 120/80 \quad \text{so} \quad R = 50\%$$

Loss or Depreciation



If a coat was on sale after Xmas for \$90.00, what did it cost before Xmas if sold at 40% discount?



$$\text{Large \#} = 90/60 = \$150.00$$

Check: % Change = $(120-80)/80 \times 100\% = 50\%$ Check: % Change = $(150-90)/150 \times 100\% = 40\%$

Note: % Change is $(\text{large} - \text{small})/\text{large} \times 100\%$

INTEREST RATE SAMPLES

A.) If one were to invest \$1,000.00 in a bank at 4.0 percent interest rate for one year, how much money would be in the savings account at a bank?

Ans:

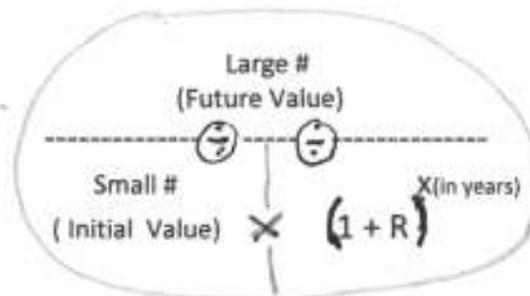
$$\$1,000 \times 0.04/\text{year} + \$1,000 \text{ initial value} = \$40 + \$1,000 = \$1,040/\text{one year (future value)}$$

B.) If one were to invest \$1,000 for 18 years (from the Rule of 72, $4 \times 18 = 72$), money left in for 18 years would about double. So, the amount of money would be about \$2,000 if initial savings was \$1,000). Note: If one were to invest \$5,000 at 6% interest rate for 12 years ($6 \times 12 = 72$), then at the end of 12 years, one would have about \$10,000 in the bank.

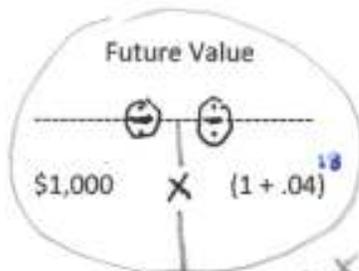
QUICKER SOLUTIONS USING MATH CIRCLES AND SCIENTIFIC CALCULATOR

Go to www.Calculator.com and select online the "Scientific Calculator"

Note: To use function y^x , 1.) enter $(1+R)$ first, 2.) select y^x , 3.) enter x (number of years)

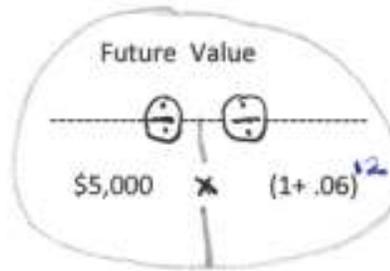


\$1,000 @ 4% @ 18 Years



$$\begin{aligned} \text{Future Value} &= \$1,000 \times (1.04)^{18} \\ &= \$1,000 \times \underline{2} = \$2,000(\text{approx}) \end{aligned}$$

\$5,000 @ 6% @ 12 years



$$\begin{aligned} \text{Future Value} &= \$5,000 \times (1.06)^{12} \\ &= \$5,000 \times \underline{2} = \$10,000(\text{approx}) \end{aligned}$$

SAMPLE SPACE MATH



A.) A spacecraft/rocket needs to travel about 25,000 miles per hour to escape the Earth's gravity at about 100 miles above the earth and it takes several ten's of minutes for the spacecraft/rocket to reach this speed to either go into orbit or to start its journey to other planets or to start its path toward the moon but it will lose speed due to the earth's gravity unless additional power is applied to the spacecraft/rocket system. Note: A spacecraft can pick up "additional free energy" by passing near a planet such as Venus by using a "sling shot effect" at the appropriate time

If the spacecraft/rocket is traveling at a constant 25,000 miles per hour and is 240,000 miles from the moon, how long would it take the rocket to reach the vicinity of the moon? Note: The vehicle will actually lose speed due to gravity and it normally will take up to 3 days to accomplish this unless additional fuel is employed.

$$\text{Want time} > \frac{1 \text{ hour}}{25,000 \text{ miles}} \times 240,000 \text{ miles} = 9.6 \text{ hours}$$

B.) If the same spacecraft/rocket were to travel to the Sun, which is about 93,000,000 miles away, how many days would it take to reach the Sun?

$$\text{Want time} > \frac{1 \text{ hour}}{25,000 \text{ miles}} \times 93,000,000 \text{ miles} \times \frac{1 \text{ day}}{24 \text{ hours}} = 155 \text{ days}$$

C.) If high energy Sun particles travel near the speed of light at about 186,000 miles/second during high solar activity, how long would it take these particles to reach the Earth?

$$\text{Want time} > \frac{1 \text{ second}}{186,000 \text{ miles}} \times 93,000,000 \text{ miles} = 500 \text{ seconds or}$$

$$= 500 \text{ seconds} \times \frac{1 \text{ minute}}{60 \text{ seconds}} = 8.33 \text{ minutes}$$

TWO STABLE POINTS SATELLITES ARE PLACED FOR OPERATIONS Fig 7



Location of point L1 in the above diagram from the Earth, is about 1% of the distance to the Sun, approximately 930,000 miles from the Earth, is a stable point between the Sun and Earth. That is, the gravity pull from the Sun on a spacecraft is about equal to the gravity pull from the earth/moon systems. So the United States and other countries send satellites to L1 to assist in monitoring the solar activity to provide early warnings in case of severe solar activity. Also, the G1 positions are about 22,000 miles from the earth and when a satellite reaches that position, it can be adjusted to "synchronize" to the earth's rotation (i.e. makes one revolution per day) and can remain over the same earth area for communications, weather reporting, etc. The US and other countries placed satellites in those positions for operations. The US has GOES-W and GOES-E weather satellites at G1 points to monitor hurricanes and track tornadoes, etc.

How much time do people on earth have to react after detecting severe slower moving solar flares at the L1 point? Note: It takes about two days for this activity to reach the satellite at the L1 point and would reach the Earth several hours later. Once the Solar activity Sun is detected by the spacecraft, the information is transmitted in near real time (at speed of light) to earth to alert/notify Astronauts and other faculties etc., the alert time must be quick. Once detected and processed, the data would start arriving at the Earth in about 5 seconds from the satellite placed at L1 to provide warnings (see below).

$$\text{Want time} > \frac{1 \text{ second}}{186,000 \text{ miles}} \times 930,000 \text{ miles} = 5 \text{ seconds}$$

If one were to stand on the equator on earth and viewed from a person at the L1 position, how fast would the person on the equator be moving in miles per hour? Assume the earth's diameter is 7,928 miles (Circumference = 3.1416 X Diameter = 24,907 miles).

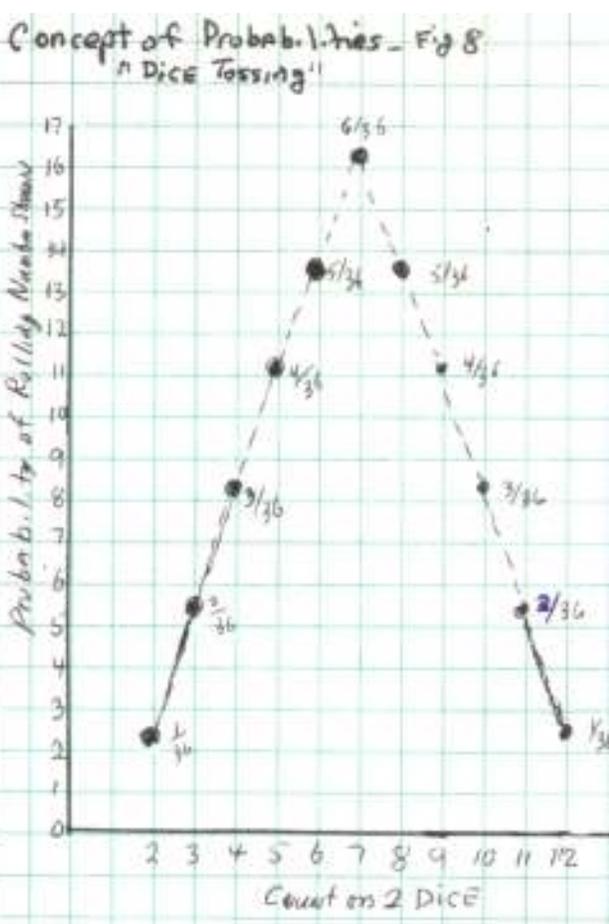
$$\text{Want miles/hour} > \frac{1 \text{ Revolution}}{\text{Day}} \times \frac{24,907 \text{ miles}}{\text{Revolution}} \times \frac{1 \text{ day}}{24 \text{ hours}} = \frac{1,038 \text{ miles}}{\text{hour}}$$

Note: The earth's orbital speed around the Sun is about 66,000 miles/hour, found by taking the distanced(d) traveled around the Sun in one year(t), speed=d/t.

2 Dice value Probabilities	Sum of 2 Dice											
	2	3	4	5	6	7	8	9	10	11	12	
1	1	2										
1	2	3										
1	3		4									
1	4			5								
1	5				6							
1	6					7						
<hr/>												
2	1	3										
2	2		4									
2	3			5								
2	4				6							
2	5					7						
2	6						8					
<hr/>												
3	1		4									
3	2			5								
3	3				6							
3	4					7						
3	5						8					
3	6							9				
<hr/>												
4	1			5								
4	2				6							
4	3					7						
4	4						8					
4	5							9				
4	6								10			
<hr/>												
5	1				6							
5	2					7						
5	3						8					
5	4							9				
5	5								10			
5	6									11		
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6	1					7						
6	2						8					
6	3							9				
6	4								10			
6	5									11		
6	6										12	

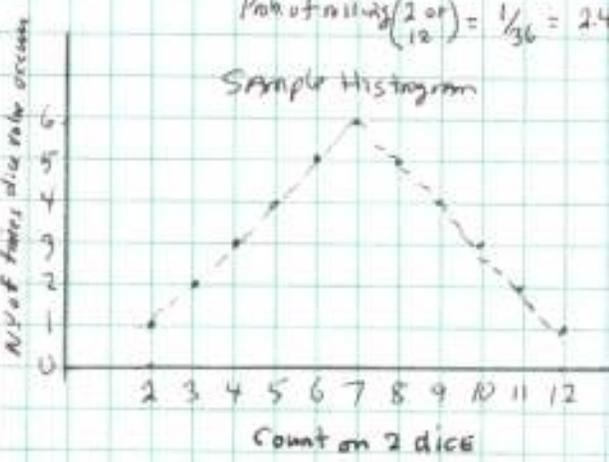
36
6 x 6
21

1 2 3 4 5 6 5 4 3 2 1
Number of times each dice
← total



example: Prob. of rolling 7 = $\frac{6 \text{ times}}{36} = \frac{1}{6}$

Prob. of rolling (2 or 12) = $\frac{1}{36} = 2.4$

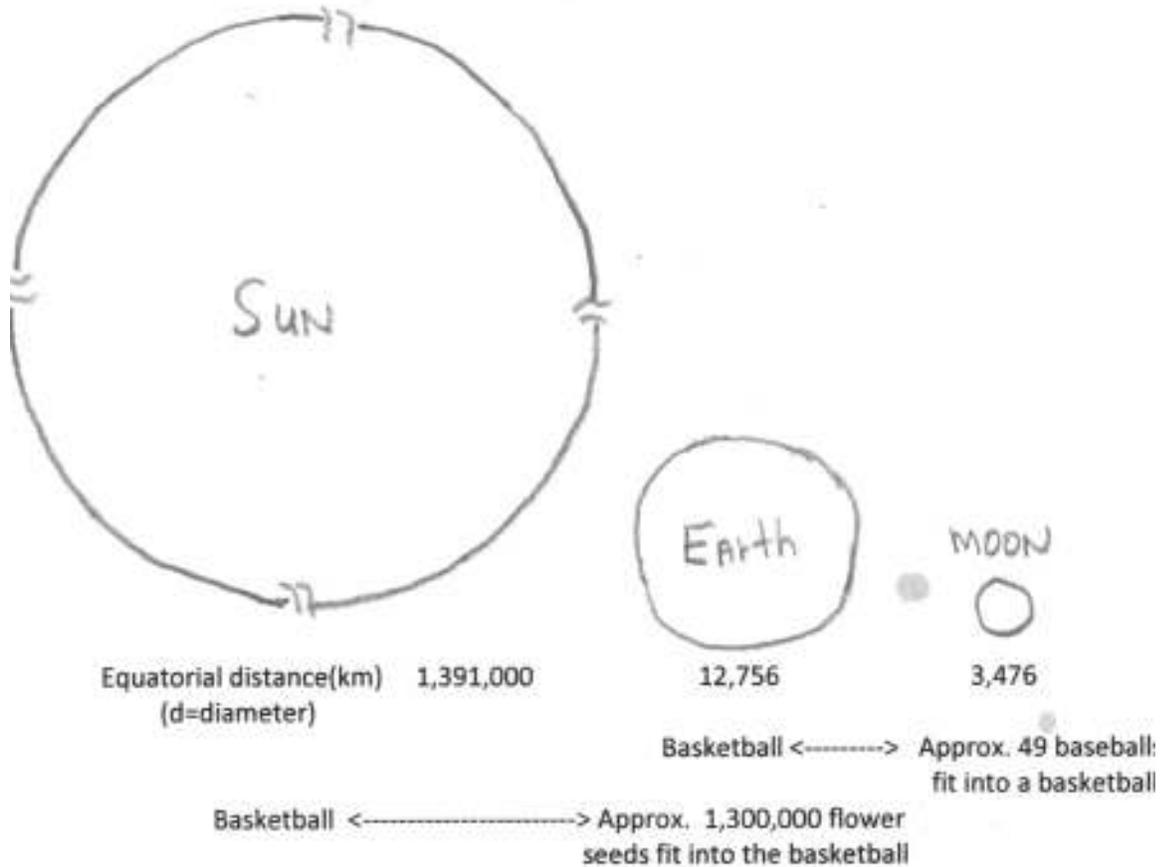


← 7 occurs 6 times
← 2 + 12 only occur 1 time

Figure 9 - SCALED MODEL CONCEPTS
(Figures below are not to scale)

View this website for better scaled model :

<http://www.co-intelligence.org/newsletter/comparisons.html> (click at next page)



$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3 = \frac{\pi}{6} d^3, \text{ where the diameter (d) = } 2 \times r$$

$$\text{Taking the Ratio } \frac{\text{Sun Volume}}{\text{Earth Volume}} = \frac{1,391,000^3}{12,756^3}$$

$$= 1,300,000 \text{ Earths fit into the Sun}$$

$$\text{Ratio } \frac{\text{Earth Volume}}{\text{Moon Volume}} = \frac{12,756^3}{3,476^3}$$

$$= 49 \text{ plus Moons fit into the Earth}$$

Fig 9 scale model active link: <http://www.co-intelligence.org/newsletter/comparisons.html>

- 1 <http://www.enchantedlearning.com/subjects/astronomy/planets/earth/Continents.shtml>
- 2 http://kids.earth.nasa.gov/archive/pangaea/Pangaea_game.html
- 3 <http://www.enchantedlearning.com/subjects/dinosaurs/glossary/Contdrift.shtml>
- 4 <http://www.pbs.org/deepspace/timeline/index.html>
- 5 <http://www.youtube.com/watch?v=hSZqhR5XKM>
- 6 <http://www.solarviews.com/eng/tercrate.htm>
- 7 <http://www.daviddarling.info/encyclopedia/A/accretiond.html> accretion disk, solar system
- 8 <http://www.environmentalgraffiti.com/featured/10-greatest-major-impact-craters-on-earth/1403>
- 9 <http://goes.gsfc.nasa.gov/>
- 10 <http://www.hickerphoto.com/pictures-of-volcanoes-photos.htm>
- 11 http://www.geology.sdsu.edu/how_volcanoes_work/
- 12 <http://www.volcano.si.edu/world/region.cfm?rnum=18>
- 13 <http://www.crystalinks.com/rof.html>
- 14 <http://ngm.nationalgeographic.com/2006/12/early-earth/video-interactive> early earth
- 15 <http://hyperphysics.phy-astr.gsu.edu/hbase/magnetic/magearth.html>
- 16 <http://scign.jpl.nasa.gov/learn/plate1.htm>
- 17 <http://csep10.phys.utk.edu/astr161/lect/earth/magnetic.html>
- 18 <http://www.youtube.com/watch?v=w9ygYqj4rVM> watch Tsunami coming in
- 19 <http://www.tsunami.noaa.gov/>
- 20 http://www.museum.state.il.us/exhibits/ice_aggs/
- 21 <http://culter.colorado.edu/~saelias/glacier.html>
- 22 http://en.wikipedia.org/wiki/Milankovitch_cycles#Earth.E2.80.99s_movements
- 23 <http://www.enviroliteracy.org/article.php/545.html> earth's conveyor belts

- 24 http://en.wikipedia.org/wiki/Solar_variation solar cycle sunspots
- 25 http://en.wikipedia.org/wiki/Jet_stream jet streams
- 26 [http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/cyc/upa/jet.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/cyc/upa/jet.rxml)
- 27 <http://library.thinkquest.org/29033/begin/earthsunmoon.htm> sun, moon, earth model
- 28 <http://www.universetoday.com/guide-to-space/earth/gravity-of-the-earth/>
- 29 <http://en.wikipedia.org/wiki/Gravitation>
- 30 <http://www.divediscover.whoi.edu/iceage/timeline.html> ice age time line
- 31 <http://www.pmel.noaa.gov/tao/elnino/el-nino-story.html> El Nino and La Nina
- 32 <http://www.bing.com/images/search?q=volcanoes&FORM=IGRE&qvpt=volcanoes#>
- 33 http://www.learner.org/resources/series42.html#program_descriptions Great Edc. Physics Videos
- 34 <http://news.discovery.com/space/asteroid-life-origins.html>
- 35 <http://science.discovery.com/>
- 36 www.metriccalculator.com
- 37 www.calculator.com
- 38 www.webgraphing.com
- 39 <http://www.wbuf.noaa.gov/tempfc.htm>
- 40 <http://breathingearth.net>
- 41 <http://www.kidsastronomy.com/earth/moons.htm>
- 42 <http://www.historyoftheuniverse.com/tl1.html> universe time line
- 43 <http://www.divediscover.whoi.edu/iceage/timeline.html> ice age time line
- 44 <http://www.pbs.org/wgbh/nova/warnings/stories/nojs.html> various "climate" data graphs
- 45 <http://www.freemars.org/jeff/planets/planets5.htm>
- 46 <http://www.enchantedlearning.com/subjects/astronomy/planets/>
- 47 http://galileoandstein.physics.virginia.edu/more_stuff/flashlets/kepler6.htm
- 48 <http://mistupid.com/astronomy/orbits.htm>

- 49 <http://www.go-astronomy.com/planets/planet-moons.htm>
- 50 <http://burro.astr.cwru.edu/stu/advanced/index.html>
- 51 <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Asteroids>
- 52 <http://windows2universe.org/earth/Magnetosphere/overview.html>
- 53 <http://www.enchantedlearning.com/subjects/astronomy/planets/earth/Magnetosphere.shtml>
- 54 <http://hyperphysics.phy-astr.gsu.edu/hbase/magnetic/magearth.html>
- 55 <http://www.youtube.com/watch?v=zazuzkO9nNk&feature=related>
- 56 <http://csep10.phys.utk.edu/astr161/lect/earth/magnetic.html>
- 57 <http://www.pbs.org/wgbh/nova/megavolcano/blasts.html>
- 58 <http://www.nasa.gov/topics/earth/features/oilspill/index.html> gulf oil spill from GSFC/NASA Satellites
- 59 http://www.physics.sjsu.edu/becker/physics51/mag_field.htm magnetic fields and forces
- 60 http://education.jlab.org/qa/pen_number.html atomic numbers and elements, etc.
- 61 <http://web.jjay.cuny.edu/~acarp/NSC/3-atoms.htm> hydrogen and its isotopes
- 62 <http://www.youtube.com/watch?v=Vi91qyjknM> over view of the electron, proton, neutron, etc.
- 63 <http://www.dinosauria.com/dml/maps.htm> view recent- ancient earth-land mass changes
- 64 <http://hubblesite.org/>
- 65 <http://cass.ucsd.edu/public/tutorial/MW.html>
- 66 <http://science.nationalgeographic.com/science/space/solar-system>
- 67 <http://solarsystem.nasa.gov/planets/profile.cfm?Object=Comets>
- 68 <http://www.swpc.noaa.gov/primer/primer.html>
- 69 <http://solarscience.msfc.nasa.gov/SolarWind.shtml>
- 70 <http://www.noaa.gov/satellites.html>
- 71 <http://www-spf.gsfc.nasa.gov/Education/wlagran.html>
- 72 <http://maps.nationalgeographic.com/maps/print-collection/milky-way.html> Milky Way Map
- 73 http://www.colorado.edu/geography/gcraft/notes/gps/gps_f.html GPS System

- R1.)NUCLEUS- A TRIP INTO THE HEART OF MATTER BY
RAY MACKINTOSH, JIM AL-KHALILI, BOJORN HONSON AND TERESA PENA
- R2.) THE WORLD OF ATOMS AND QUARKS BY ALBERT STEWERTKA
- R3.) ONE UNIVERSE-AT HOME IN THE COSMOS BY
NEIL DEGRASSE TYSON, CHARLES LIU, AND ROBERT LRION
- R4.) BEYOND EARTH-Mapping the Universe edited by David De Vorkin
- R5.) PREHISTORIC PAST REVEALED-The four billion year history of life on Earth by Douglas Palmer
- R6.) HUBBLE REVISTED-New Images from the Discovery Machine by Fischer and Hilmar Duerbeck
- R7.) NATIONAL GEOGRAPHIC – ATLAS OF THE OCEAN- THE DEEP FRONTIER bySyliva A. Earle
- R8.) The Historical Atlas of the Earth – A Visual Celebration of Earth’s Physical Past
By Stephen Jay Gould, Roger Osborne and Donald Tarling
- R9.) SECRETS OF SPACE- EXPLORING THE ORGINS OF THE UNIVERSE, Stuart A. Kallen
- R10.) GREAT INVENTIONS: THE TELESCOPE AND MICROSCOPE, ROBIN DOAK
- R11.) FARAWAY WORLDS- PLANETS BEYOND OUR SOLAR SYSTEM – PAUL HALPERN AND
ILLUSTRATED BY LYNETTE R. COOK
- R12.) SCHOLASTIC ATLAS OF EARTH, SCHOLASTIC REFERENCE AN IMPRINT OF SCHOLASTIC
- R13.) WHY DO VOLCANOES ERUPT? DR. PHILIP WHITFIELD WITH THE NATURAL HISTORY MUSEUM
- R14.) THE HISTORICAL ATLAS OF THE EARTH –A VISUAL CELEBRATION OF EARTH’S PHYSICAL PAST
STEPHEN JAY GOULD, CONSULTANT EDITOR AND ROGER OSBORNE & DONALD TARLING,

GENERAL Comments/Websites from viewers:

David P. Stern, <http://www.phy6.org/readfirst.htm> and <http://www.phy6.org/stargaze/Scalend.htm>

A CONCEPT OF GRAVITATIONAL ATTRACTION/FORCE and BRIEF DISCUSSION ABOUT MOONS by Tom Karras

A CONCEPT OF GRAVITATIONAL ATTRACTION/FORCE: Place a very light “ping pong ball” at the center of a circular-level trampoline and it will not deflect the center and when one places a “marble” at the edge it will stay there. However when one places a very heavy bowling ball at the center, the “warping of the fabric of the trampolines cover” will push on the marble and the marble will roll towards the center (Note: On earth the marble rolls downhill toward the bowling ball due to gravity of the earth but in outer space, it is the warping of the space-time which produces the attraction/forces). See Website: <http://library.thinkquest.org/25886/ywarpspac.htm> . If the marble were given enough push/circular energy to overcome the “gravitational effects of the trampolines cover against the marble” and overcome any frictional effects, then the marble could remain rotating around the edge of the trampoline: Note: This is how planets continue to rotate around the sun or the moon rotating around the earth, etc. due to either their potential and/or kinetic energy; **our earth orbits the sun at about 66,600 miles/hr** and with lots of kinetic energy. BRIEF DISCUSSION ABOUT MOONS: A moon is a large object/satellite which orbits a planet. An asteroid over 1Km in size orbiting either a planet or another asteroid would be considered a “moon” around that object. Planets are large spherical objects which orbit the Sun. Asteroids are too small, like Pluto, to be called a planet. Planet Neptune’s Moon(Triton) probably was a large asteroid(size of Pluto)captured by Neptune’s gravity since its orbit is retrograde (opposite) to Neptune’s rotation, and due to gravity, may eventually be broken up and/or crash into Neptune. Uranus rotates on its side and was probably due to the angle and direction of an asteroid’s collision path. Saturn’s rings and small moons are thought to be caused by collisions of an incoming icy-comet crashing into orbiting asteroids/moons of Saturn. The observed rings’ brightness is due to the light from our Sun’s reflection off the many millions of objects/moons orbiting Saturn for most of these objects are like large-smooth reflecting blocks of ice.

Note: Our Solar System orbits the Milky Way Galaxy about 500,000 miles/hr and takes about 230 Million years to complete one orbit rotation.

1.) BACKGROUND:

Elements are made of atoms consisting of a specific number of protons (+ charged particles) and neutrons (uncharged) in the nuclei and surrounded by a specific number of electrons (- negative charged orbiting the nuclei). Most atoms in nature are considered to be stable when the net charge is zero; however, others are unstable because extra neutrons give the atoms extra energy. The neutrons are “like” glue holding two or more protons in the nuclei together to keep them from flying apart. Since like charges repel each other; each proton can attract and pull in one electron to attach to the atom. The electrons orbit in one or more specific energy levels in a cloud surrounding the nucleus. The first element is Hydrogen and has one electron and one proton; with only one proton in the nucleus there is no need to have a neutron. However, Helium, second element, has two protons in the nucleus and two neutrons are required to hold the two protons together. View atomic structure on the internet at: <http://web.ijay.cuny.edu/~acarp/NSC/3-atoms.htm> (1).

The standard acceptable model for particle physics is for each of the protons and neutrons in the nuclei to have three sub-atomic particles; these sub-atomic particles are called “quarks” and there are even more sub-sub-atomic particles being discovered but will not be the subject of this article, view website at: <http://www.youtube.com/watch?v=Vi91qyjuknM> (2)

An “ion” is an atom or molecule carrying a net positive or net negative charge when the atom either loses or gains electrons. An “isotope” is a form of chemical element with varying numbers of neutrons but with the same (unchanged) number of protons. The number of protons never changes in an atom. When an atom loses an electron by external or internal forces, it emits and gives off energy in forms of heat, light, etc. and when the atom gains an electron, it gains energy and can be unstable and very energetic. The “Unstable isotopes” emit various forms of radioactivity; there are both stable and unstable isotopes.

The atomic number of an element is the number of protons in the atom, i.e. hydrogen is 1 and helium is 2. The atomic weight (mass number) of an element is the sum of the proton and neutrons, so hydrogen mass number is 1 and helium is 4. If the element has isotopes, the atomic weight in the periodic table is the average of the weight of the isotopes, view at: http://education.jlab.org/qa/pen_number.html (3). Heavier elements are formed when large Sun’s exploded and die. There are various forms of the periodic table on the internet and each provides different levels of Information, view some of these websites: <http://www.chemcool.com/> (4): <http://periodictable.com/> (5): <http://www.ptable.com/> (6): <http://www.periodicvideos.com/> Each element of the periodic table has unique spectra of colors/ fingerprint. Scientists have developed instruments to determine and measure amounts of elements, oxygen, hydrogen, etc. for objects both inside and outside the earth’s atmosphere and outer space. An element is a substance which cannot be broken down by chemical reaction but by rays and particles; most elements (92) are naturally made in the Universe and some (currently 25) are made artificially by humans. <http://members.misty.com/don/spectra.html> (7)

The earth's atmosphere generally filters out or blocks the higher frequency rays and particles of radiation from the sun. "High" energy x-rays and gamma rays can penetrate earth's external magnetic field and atmosphere during periods of high sun spot activity. Also high energy cosmic rays from outer space, such as exploding black holes or stars, can penetrate our atmosphere; particles in the atmosphere break up cosmic rays (mostly protons) into gamma rays, electrons, and other particles which in turn can penetrate the earth, planes, etc. We will examine how emissions, absorption, and how electromagnetic radiation of particles and rays can be detected. <http://imagine.gsfc.nasa.gov/docs/science/known1/emspectrum.html> (8).

2.) OVERVIEW OF THE ELECTROMAGNETIC SPECTRUM

The electromagnetic spectrum begins from the very low frequency like low vibrating sounds which our ears can just barely receive and hear; to those which require antennas to detect; to those which we can see with our eyes; to those which we can feel/absorb heat (fireman find humans with IR goggles); to those which can be reflected or refracted off mirrors; up to extremely very high vibrating gamma rays or particles which require special materials and atoms to react with in order to detect and measure. Our ears can hear and discriminate different sounds/frequencies of a guitar or piano while a spectroscopy can discriminate energy spectrums: <http://www.lbl.gov/MicroWorlds/ALSTool/EMSpec/EMSpec2.html>
<http://hyperphysics.phy-astr.gsu.edu/hbase/ems1.html#c2>
<http://hyperphysics.phy-astr.gsu.edu/hbase/mod3.html#c1>

Light/visible spectrum range is the portion of the electromagnetic spectrum which humans can see with their eyes. There are three main colors, blue, green, and red which can make white light and all other colors we can see in the Visible Spectrum. Electromagnetic radiation energy travels at the speed of light in forms of waves and particles: <http://www.geo.mtu.edu/rs/back/spectrum/>

3.) INSTRUMENT MEASUREMENT TECHNIQUES

Antennas are employed to receive the lower frequency portion of the spectrum such as radio and microwaves; the Spitzer Space Telescope sees/absorbs the heat from the infrared light from outer space; the Hubble Space Telescope sees the visible light from stars and planets; sensitive ultraviolet telescopes detected UV rays from galaxies/stars; the Chandra X-Ray Observatory is a special telescope designed to absorb and detect X-Rays, and the Compton Gamma Ray Observatory is designed to detect gamma rays from their interactions with atoms. See websites: <http://www.nasa.gov/> great starting point, NASA <http://nssdc.gsfc.nasa.gov/nmc/SpacecraftQuery.jsp><http://www.nasa.gov/missions/past/index.html>
<http://www.spacetoday.org/SolSys/Spectrometers/Spectrometers.html> spectrometers, watch IR movie <http://www.spitzer.caltech.edu/video-audio/145-ask-ir-Infrared-More-Than-Your-Eyes-Can-See>, view websites:

<http://www.spacetoday.org/DeepSpace/Telescopes/GreatObservatories/Chandra/ElectromagneticSpectrum.html>
http://coolcosmos.ipac.caltech.edu/cosmic_classroom/multiwavelength_astronomy/multiwavelength_astronomy/activities.html
<http://www.bing.com/images/search?q=electromagnetic+spectrum&FORM=IGRE&qvpt=electromagnetic+spectrum#>

There are special instruments sent into space along with telescopes, above the clouds (to remove their distortions), to detect the presence of the elements from the color footprints. The data are transmitted to earth and scientific community using antennas in the lower frequency portion of the spectrum. So the complete electromagnetic spectrum is used for many applications and experiments. Some earth based telescopes now have digital adaptive optics capability for removing atmospheric distortions.

Many instruments are used to diagnose and treat patients in the medical field from routine X-rays to injection/detection of radioactive materials in internal body analysis/gamma imaging to brain PET scans to DNA analysis. View website: http://eeweb.poly.edu/~yao/EL5823/NuclearPhysics_ch7.pdf

4.) NUCLEAR FUSION AND FISSION

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a.) NUCLEAR FUSION: On the Sun, when two or more atoms of hydrogen collide at very high pressures and temperatures, enormous amounts of energy in form of heat, light, etc are released in all directions from the Sun. Helium three(H3) is also produced in this process and travels outward. Some of the helium three (H3) makes its way through the earth's atmosphere but most of it has been piled up on the Moon. Helium three(H3) can be a good source of future fuel if we could somehow manufacture it on the moon and bring it back to the earth to produce Solar Energy; this could supply the earth's fuel needs for many years. **Our Sun produces more energy in one second than all of the earth's current nuclear bombs.**

Scientists are working on producing on earth, on a small scale, Sun's interior activity as a future source of earth's energy. Hopefully it will be operational by 2040, phasing out the need for fossil fuels.

b.) NUCLEAR FISSION: Scientists have discovered that if beams of neutrons traveling at high speeds are absorbed by Uranium 235, the collisions transform/produce other radioactive atoms and more neutrons. This process releases vast amounts of energy and a **pineapple size uranium material** can produce, during a chain reaction, a large explosion in an atomic bomb.

5.) RADIATION/CARBON DATING (DETERMINING AGES OF MATERIALS, ETC)

Radioactive Carbon 14 is found every day in the upper atmosphere where cosmic rays from outer space strike atoms of Nitrogen gas (N14) and change atoms of nitrogen gas to atoms of radioactive Carbon 14. In the atmosphere C14 joins with oxygen to form radioactive carbon dioxide. Regular carbon dioxide mixes with radioactive carbon dioxide with plants, trees, etc. After a plant or tree dies, the radioactive carbon dioxide in materials made from the tree wood or vegetation eaten by animals or people or decaying rocks begin to decay and from that time on, the ratios of the amounts of good carbon dioxide to radioactive carbon dioxide (with half-life analysis and final decay products remaining) can determine the age of death from carbon dating of people's bones and determining the ages of other materials. The carbon element is part of all living things and is one of the essential building blocks of life. Most Uranium isotopes are radioactive and decay into lead, etc. after many million years and provides for useful "age dating" for cosmos and earth materials.

6.) ENDING STATEMENT

Who knows? Does our solar system "Sun and Planets" resemble the Atom "Nucleus and Electrons" and do the galaxies resemble "molecules and compounds"? Let's take a look! For the atom, over 99% of its mass is at the center nuclei compared to the mass of the complete atom, including all orbiting electrons. Who knows? Maybe some orbiting electrons in atoms have small positive particles, let's call them "moontrons" orbiting an electron? Who knows? Maybe other particles which crashed into the atoms may resemble asteroids and comets? Our Sun's mass is about 99% of the total mass of our solar system consisting of all known orbiting planets, asteroids, comets, etc. During the early formation of our solar system, many mini-planets were forming and combining in various orbit/energy levels like electrons in atoms. Our Solar system is surrounded by an Oort cloud and atoms are surrounded by electron clouds. Does our solar system resemble macro atoms? Who knows? Our Solar systems could be like elements combining with other solar systems, forming molecules and combining with other molecules in a galaxy forming compounds. Our solar system with 9+ planets (with Pluto or the missing planet which may have decomposed into the asteroid belt), could represent a Na (Sodium w/11 electrons) to form "NaCl (a salt molecule). This could combine and react with molecules of "dark matter and dark energy producing dark flows of substances" with other solar systems to form a compound "salt" and molecules from salt could combine and form a different compound within the galaxy. Who knows? If we could look at the spectra from deep space, maybe we could see a fingerprint of sodium element and further back see that our solar system is just a molecule of "salt" and in a mountain in another planet in another universe? Galaxies have at their centers large massive black holes with other stars, etc. orbiting the center. Could our Milky Way galaxy be a compound or mixture? Most of the Universe is made up of dark matter and dark energy and galaxies appear to be clustered in groups interconnecting with dark flows. Who knows what the scientist will discover with particle accelerators and as we venture out into the cosmos?

OUTLINE

- 1.) BACKGROUND
 - 2.) OVERVIEW OF THE ELECTROMAGNETIC SPECTRUM
 - 3.) INSTRUMENT MEASUREMENTS TECHNIQUES
 - 4.) NUCLEAR FUSION AND FISSION
 - 5.) RADIATION/CARBON DATING (DETERMINING AGES OF MATERIALS, ETC)
 - 6.) ENDING STATEMENT
- WEBSITE REFERENCES

http://imagine.gsfc.nasa.gov/docs/science/know_l1/emspectrum.html

<http://science.hq.nasa.gov/kids/imagers/ems/waves3.html>

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<http://www.800mainstreet.com/spect/emission-flame-exp.html>

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<http://periodictable.com/> (5)

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<http://www.rsc.org/chemsoc/visualelements/pages/pertable fla.htm>

<http://www.periodicvideos.com/>

<http://www.ptable.com/> (6)

<http://www.chemicalelements.com/>

http://www.physics.sjsu.edu/becker/physics51/mag_field.htm magnetic fields and forces

http://education.jlab.org/qa/pen_number.html atomic numbers and elements, etc. (3)

<http://web.jjay.cuny.edu/~acarp/NSC/3-atoms.htm> hydrogen and its isotopes (1)

<http://www.youtube.com/watch?v=Vi91qyjuknM> over view of the electron, proton, neutron, etc. (2)

<http://www.lbl.gov/MicroWorlds/ALSTool/EMSpec/EMSpec2.html>

<http://www.bing.com/images/search?q=electron+shells&qpv=electron+shells&FORM=IGRE> : Great!!!

GERMANTOWN MD LIBRARY REFERENCES

- R1 UNDERSTANDING RADIOACTIVITY BY LORUS J. AND MARGERY MILNE
 R2 GREAT INVENTIONS: THE TELESCOPE AND MICROSCOPE BY ROBIN DOAK
 R3 THE INVENTORS (Nobel Prizes in Chemistry, Physics, and Medicine) by NATHAN AASENG

Part 3: RELATIONSHIP BETWEEN ELECTRICITY AND MAGNETISM- AN OVERVIEW, September 3, 2010 by Tom Karras

A.) INTRODUCTION:

It has been a scientific fact for many years that the movements of electrons can cause electric currents (electricity) to flow in a wire which makes a completed circuit connection when a voltage from a power source such as a battery is in the line of flow of the connected circuit, i.e. simple flashlight. When electric currents flow they induce or cause magnetic field lines to circle, perpendicular to the current flow in a clockwise direction, around the conducting wire carrying the electric currents or the movements of electrons. The definition of direction of current flow in the scientific community is opposite to the direction of the movement of the electrons and the “right hand rule” is used to determine magnetic field rotation direction and thumb point’s direction of current flow. This is to say, electrons are attracted and flow toward the positive (+) terminal of a battery while current flows out of the positive terminal of a battery in the opposite direction. When a compass is placed over a wire carrying the electric current, the compass needle will deflect, indicating the presence of a magnetic force field at the instant when the battery is initially switched on or turned off. Note, flowing electric current is analogous to water flowing in a river: the battery voltage/power source is analogous to the change in elevation of the river causing the potential difference in the water pressure to cause the water to flow downhill due to force of gravity; the resistance of the conducting wire to allow the electricity to flow (copper wire vs. a wire type which has a higher resistance to the release of electrons from the atoms to be released/energized) is analogous to the river floor’s resistance to the flow of water such as rocks, valleys in the river floor, curves in the river, etc which impedes or affects the flow of water. The copper atoms only have one electron in their outer energy orbital shells and make for an easier release of electrons when they are excited with heat, etc. Hence, copper wire is a good conductor of electricity.

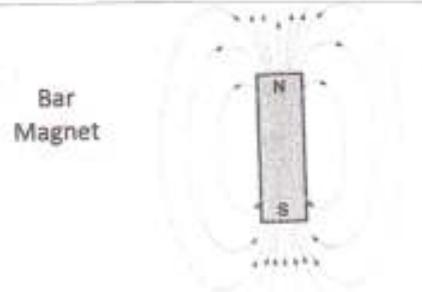
<http://hyperphysics.phy-astr.gsu.edu/hbase/magnetic/magcur.html> (1)

<http://www.youtube.com/watch?v=hX7TKEBGUXk> (2)

The chart on the next page (fig. 10) shows some basic concepts of Electricity and Magnetism and to help understand their relationships with each other. a.) Bar magnet: The magnetic field lines of a magnet exit the North Pole (N) and enter the South Pole (S); b.) Electro-Magnet: Shows how a magnetic field can be produced by winding a coil of wire around magnetic type material (such as iron), and can be temporarily magnetized and to find the direction of the magnetic (using right hand rule, circle the coil of wire in the direction of the current), the thumb points the direction of N pole; c.) Generator action: Two magnetic fields can interact with each other to produce/generate electricity. Example shows a coil of wire around a doughnut shaped iron solid cylinder connected to a light bulb. While moving a permanent magnet “in and out” of the cylinder, the magnetic field lines interact to energize the electrons in the copper wire to cause them to move, producing electricity and light up the bulb. d.) Hydro-Electric Power System: When a motor in c.) above can be made to turn a magnet inside the coil of wire, then electric power can be produced using gravity from damming up water and turning turbine wheels. This is basically how power plants near rivers/dams work today. Note: if one adds a battery to the rotor windings on the shaft and reconfigures both the fixed and shaft magnets, motor action can occur, i.e. like a simple direct current hand drill.

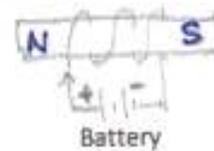
Fig. 10 ELECTRICITY AND MAGNETISM CONCEPTS

Magnetic field lines surround a permanent magnet, such as Iron or Nickel material. The lines of magnetic field from a bar magnet form closed lines of magnetic field lines of force. The magnetic field lines come out of the North pole of the magnet and into the South pole.



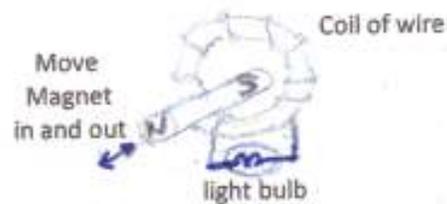
If one wraps a conducting material such as copper wire around a piece of iron and connects a battery to the wire, electrons become hot/excited and the moving electrons produce magnetic field lines in and around the Iron thus producing an "electro-magnet" as long as the battery stays connected. Note: some materials can become permanent magnets once they are excited.

Electro-Magnet Concept



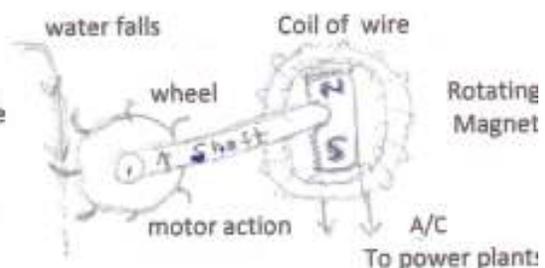
When one wraps copper wiring around a coil and magnetic field lines can be made to move in and out, over and around a copper coil, electrons are excited and heated and move in the wire to produce electricity to turn on a light bulb when magnetic field is moving.

Generator Action Concept



If one places a wheel near water falls and the wheel is positioned to rotate from falling water and a wheel shaft is connected to a magnet causing it to rotate to produce magnetic fields over a conducting material, this will produce a Hydro-Electric Power Plant to provide electric power to homes, etc. Note: The wheel is a "motor action" to turn the magnet and the magnetic-wire housing system is a "generator" action. One could also cause the "motor action" to rotate a coil of wire within magnetic field to produce electricity.

Hydro-Electric Power System Concept



The following website shows how magnets attract and repel and provides an overview of the earth's magnetic field: http://www.physics.sjsu.edu/becker/physics51/mag_field.htm (3) along with several examples of items previously discussed above. Note in the website, that the present geographic north pole of the earth is actually the South Pole of a magnetic, so a compass needle's North Pole would line up with the earth's magnetic fields lines to point to the northern portion of the earth. The earth has undergone many magnetic pole reversals and the last one was over 750,000 years ago. The earth's magnetic fields protect us from the solar radiation and cosmic rays from outer space. Without a strong magnetic field, the Sun's energy could strip away our atmosphere and could result in an inhabitable earth like our sister planet Mars. The earth's magnetic field is produced by the effects of a hot inner iron core melting the materials inside the earth and due to the earth's rotation action (motor action) and the movements of the electrons and circulating currents (generator) action; the earth's magnetic field is then produced. view: http://en.wikipedia.org/wiki/Earth%27s_magnetic_field .

When charged particles from the Sun enter the earth's magnetic field, the protons can be trapped in the inner layer of the Van Allen belt while the electrons are trapped in the outer Van Allen belt. During high Solar activity, particles can get to the North and South Poles areas of the earth and provide a connection circuit through the magnetic field lines lighting up the atmosphere, called (Aurora Borealis).

<http://www.regentsprep.org/Regents/physics/phys03/cdeflecte/default.htm>. Magnetic fields (and Electric fields) can be used to trap, deflect, or even speed up the flow of particles, i.e. high voltage sources in a particle accelerator. Unlike poles of magnets attract (pull in) each other and like poles repel (pushes away). These magnetic forces (F_m) have been known to be directly related/proportional to the strengths of each pole (P_1, P_2) and the force is "inversely" related to the "square" of the distance (d) and a universal constant has been developed and measured and is labeled K_m , so the basic equation for the force is $F_m = K_m \frac{P_1 \times P_2}{d^2}$. <http://magician.ucsd.edu/Essentials/WebBookse7.html> (5)

An example would be to have two unlike large magnets separated lying on a table and hold down one with your left hand and the other with right hand separated by "2 inches": Let's assume your total force exerted to keep them separated is 16 pounds of force. If you separate the magnets on the table to "4 inches", the total force needed to hold down the magnets would not be 8 pounds but only 4 pounds. Like manner, if you move the magnets "1 inch apart", the total force to keep them separated would be 64 pounds. This is one concept of the meaning of "inversely proportional to the square of the distance".

A simple example of the constant associated with equations (i.e. K_m above), is the circumference of a circle is directly related or proportional to the diameter of the circle; $C = K_c \times d$, so any circle, take the ratio of the circumference to its diameter $K_c = C/d$, you would obtain a constant number of about 3.1416 which has the symbol "pie" in mathematics. The magnetic constant above for $K_m = 1 \times 10^{-7}$.

C.) ELECTRIC FIELDS AND FORCES

Positive and negative particles (i.e. protons and electrons) have electric fields radiating from all directions away from the positive charges and flow into the negative charges. View website below: <http://library.thinkquest.org/10796/ch12/ch12.htm> (6). Positive charges attract and try to combine with negative charges and like charges repel. The force between the charges is $F_e = K_e \frac{q_1 \times q_2}{d^2}$, where the electric charge constant for $K_e = 9 \times 10^9$.

D.) SPEED OF LIGHT AND ELECTRICITY/MAGNETISM RELATIONSHIP

It was determined that if one takes the ratio of $K_e/K_m = 9 \times 10^9 / 1 \times 10^{-7} = 9 \times 10^{16}$ and by taking the square root of both sides, yields 3×10^8 meters/sec or 186,000 miles per sec which is the speed of light. So there are both mathematical and physical relationships between electricity and magnetism.

<http://hyperphysics.phy-astr.gsu.edu/hbase/magnetic/magcur.html> (1)

<http://www.youtube.com/watch?v=hX7TKEBGUXk> (2)

<http://www.regentsprep.org/Regents/physics/phys03/cdeflecte/default.htm> MF deflects particles

<http://www-istp.gsfc.nasa.gov/Education/wmfield.html> examples of magnetic fields

<http://library.thinkquest.org/10796/ch12/ch12.htm> (6) electric fields

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A THEORY WHY THERE ARE DIFFERENT NATIONALITIES AND DIFFERENT FORMS OF LIFE:

by Tom Karras, Feb. 17, 2011

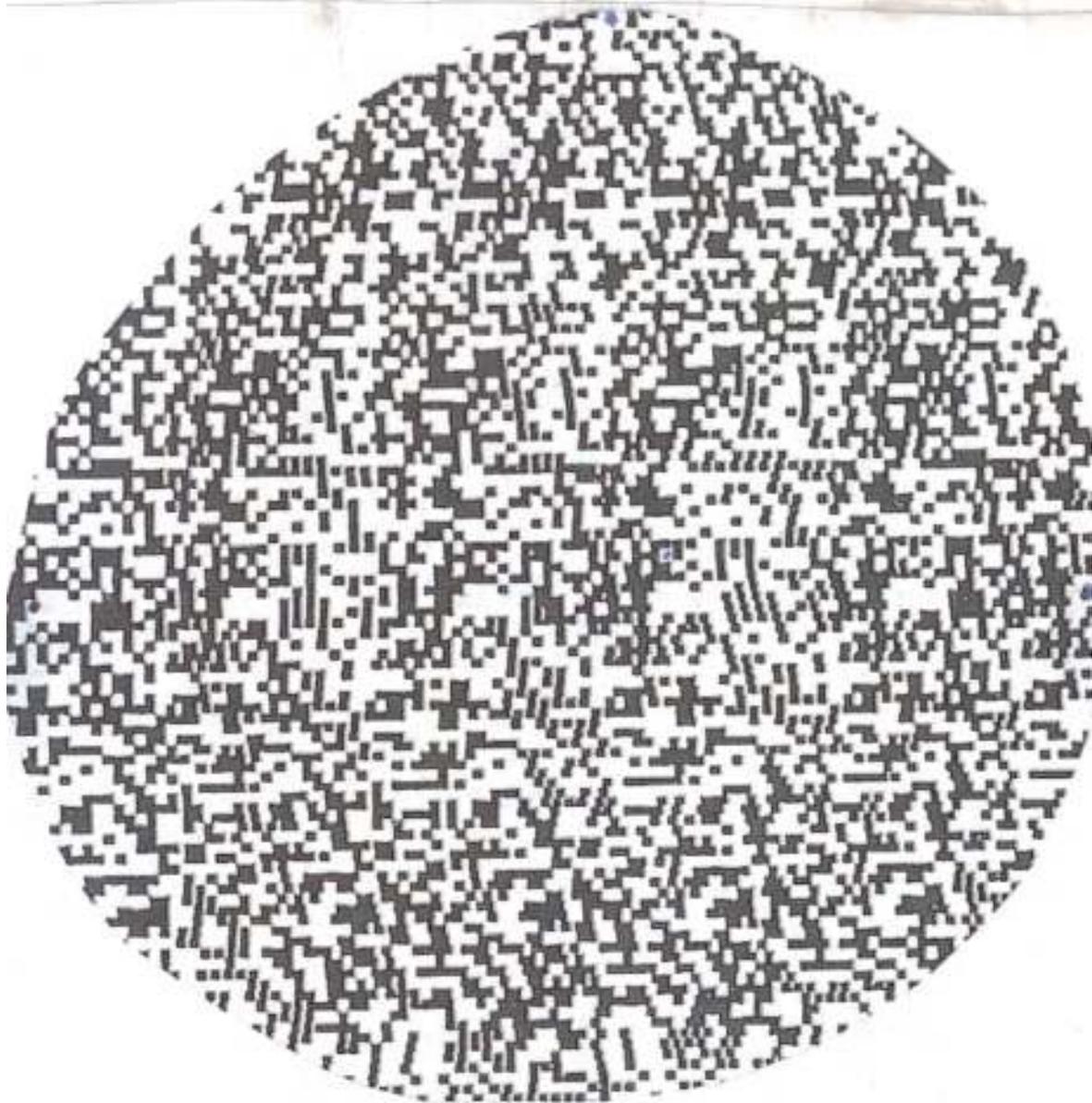
In the early stages of Earth's development, different forms of life, plants, animals, mammals, fish, humans etc. were formed near "hot water" areas of volcanoes by the interaction of different types of molecules, RNA, and DNA, etc. Since the volcanic materials in each of the areas of Earth are different, different types/forms of animals, mammals, fish, and humans etc. were formed. Volcanoes probably first started in Africa and that is why humans appeared first in Africa. They then migrated to different continents. Interbreeding occurred amongst each of the different species making even more versions of life. Also, there could be even different forms of life developed on the earth from different materials from comets, asteroids, etc which had crashed on the earth in the early days. Is it possible? that "Cave People" may have originally been produced through the mating processes, in the colder months, in the caves with gases or radioactive elements by "Apes and Bears, etc." of different male/female DNA combinations" and evolved into today's humans over time with future mating of the different "Cave People" male/female's. Would Charles Darwin be "rolling over in his grave" with this theory?

ASTEROIDS IN THE ASTEROID BELT AND SOME NEAR EARTH CROSSING ASTEROIDS LOCATED SO FAR:

A math sample (view: http://www.sdss.org/data/ast_belt.web1.gif): If two asteroids in the Asteroid Belt at 2.7 AU (1 AU= 93,000,000 miles, the distance from the Earth to the Sun) collide and one asteroid, traveling at 40,000 miles per hour is on a direct collision path to the Earth. How many days before it crashes into the earth? Answer: $1.7 \times 93,000,000 \text{ miles} \times 1\text{hr}/40,000 \text{ miles} \times 1 \text{ day}/24 \text{ hr} = 165 \text{ days}$.

SO IF THIS WERE TO HAPPEN, WE WOULD ONLY HAVE ABOUT 5.5 to 6 MONTHS TO TAKE APPROPRIATE ACTION!

Note: View some earth crossing asteroids by selecting "what" at: <http://users.tricity.wsu.edu/~hudson/Research/Asteroids/index.htm>



VIEWING CLOSE TO THE SCREEN AND FOCUSING ON ONE SPOT NEAR THE CENTER, SLOWLY MOVE BACK UNTIL YOU SEE A 3-D OBJECT, i.e., AN "INVERTED MEXICAN HAT".
NOTE: LONG VIEWING TIME IS NOT RECOMMENDED.

A.)GRAVITY: It has been determined by Sir Isaac Newton that the force which a moving object exerts on another object which may be at rest is: $F=MA$, where “M” is the mass of the moving object and “A” is its acceleration. As in billiard balls, most of the energy from the white (cue ball) is transferred to the other billiard balls. It has also been determined that the force of gravity between two planets or say the gravitation force (F_g) between the Earth and Moon is $F_g = G \times (M_e \times M_m) / d^2$ where (M_e) is the mass of the Earth and (M_m) is the mass of the moon. As in the magnetic and electric forces, the gravitation force between two masses is inversely proportional to the square of the distance (d) between the two masses. The gravitation constant $G = 6.67 \times 10^{-11}$. The moon and earth’s gravity forces keep the two objects stable since the moon’s rotational energy/momentum offsets the net gravitational force between them and for the Sun/Earth-Moon. <http://library.thinkquest.org/10796/ch12/ch12.htm> Newton’s equations also proved Galileo’s theory that when dropped in a vacuum from the same distance, both a “feather and a hammer” would fall/arrive at the same time on the ground; this was demonstrated during one of the Apollo moon landings by an astronaut. View also Albert Einstein’s Gravity equivalence principal: <http://www.astronomynotes.com/relativity/s3.htm>

B.)SPACE-TIME: About 100 years ago **Albert Einstein’s “General Relativity”** showed that the effect of gravity in the Universe is to bend the fabric of Space-Time as light or particles or even large objects as they travel near them. <http://www.ws5.com/spacetime/>. This bending of space-time was first proven during a solar eclipse (where the moon blocks the sunlight on the earth).The light from the stars directly behind the Sun can be seen on the Earth where the maximum moons shadow appears. This proved Einstein’s “gravitational lensing” theory to be correct. That is, the Sun’s gravity bends/steers the starlight rays around and back in front of the Sun as they head toward the Earth. The experiment showed that all 92 or so of the Stars known at that time to be directly behind the eclipsed Sun showed up in the ground telescope system. Einstein did not receive the Nobel Prize for this discovery!?

Einstein showed that Newton’s $F=MA$ should be modified due to gravity by $F=MA (1-V^2/C^2)^{3/2}$ which also explained Mercury’s Orbit.

C.)TIME: Einstein showed that the effects of gravity are to slow clocks down. Clocks in tall buildings run slightly faster than those near the ground; time nearly stops as one approach’s a black hole due to the excessive gravity. The clocks in orbiting satellites runs faster with respect to the time clocks on the earth; in the case of the GPS satellites, this time change is small but must be adjusted to obtain precise location on the earth since the GPS receivers mark the time of arrival from the nearest four GPS satellites for position location, see: http://einstein.stanford.edu/content/faqs/gpa_vessot.html . **Einstein showed in his “Special Relativity”** analysis, with Lorentz Transformation , if an astronaut could survive in a space rocket for 30 years at 80% of the speed of light, that 50 years of time would elapsed on the earth; upon returning, the astronaut would be 20 years younger and will have traveled into the future.

This is computed by $t = t' / (1 - V^2/C^2)^{1/2} = 30 / (1 - 0.8^2)^{1/2} = 30 / (1 - 0.64)^{1/2} = 30 / 0.6 = 50$ years

D.)ENERGY: A car battery has “potential energy” and when the car ignition is turned on, the potential energy is converted to “mechanical energy” and when in motion, car fuel transfers to “kinetic energy”. A water dam has “potential gravitational energy” and when the floor gates are opened up, the water begins to flow, and converts water energy to “electric power energy”. So, various forms of energy are always in constant transformation. Einstein showed that even small atomic particles can produce large amounts of energy (E) under certain conditions with $E=mc^2$ (or $E= M \times C \times C$), where “M” is the mass of the object and “C” is the speed of light. In this formula, energy is directly proportional to the square of the speed of light, i.e. energy increases as mass increases. Energy can be very high even though the mass is small since energy is directly affected by the speed of light times the speed of light (directly proportional to the square of the speed of light). This resulted in the creation of the Atomic Bomb which helped to end World War II, view: http://en.wikipedia.org/wiki/Albert_Einstein :

The older original model of the Atom consists of electrons orbiting the nucleus which contained only protons and possibly neutrons. The current accepted model for the Atom in Physics is for each of the protons and neutrons to have three quarks and the quarks are connected together with smaller particles called gluons. A gluon has no mass and acts “like glue” holding the nucleus together and is a carrier of the strong nuclear force and acts only in very small ranges within the nuclei. The proton has two up quarks and one down quark while the neutron has two down quarks and one up quark. An up quark has an electric charge of $+2/3$'s and the down quark electrical charge is $-1/3$; so the net charge of the proton is preserved at $+1$ and the neutron charge is 0 . View the website below for the Helium element with two electrons; the two protons and two neutrons each have three quarks:

<http://www.exploratorium.edu/origins/cern/ideas/standard.html> .

Who knows?, “the author is assuming for a very short time the neutrons can have reverse anti-quark charges for the purposes of figures 12, 13, and 14, so this would be reversed to $-2/3$ and $+1/3$ charges for neutrons”. Note: This may violate current Standard Model Laws but is only being introduced as a possible theory. Figure 12 below is the author’s concept of how the nuclear forces may work within and between the quarks for this assumption and how they may interact with the two orbiting electrons for the helium element with each of the quark’s electric charges. As one can see, both the strong internal nuclear forces and the electric forces with the electrons all appear to be balanced. Since unlike charges attracts, it appears that this concept could be what is occurring inside the nuclei of the atom; particle spin, mass, and various particle states/colors, etc. have not been taken into account and is assumed to cancel out. Figures 13 and 14 is the authors concept of how Helium may become unbalanced and unstable, who knows? for Figure 13 could mean that one of the neutrons (N2) could be released by the electric forces of both electrons, for it appears that there could be a situation where no bond exists with P2/N2 and the bond of the quarks is weak with P1/N2. Who knows?, Figure 14 also shows a situation where both electrons could result in pulling out proton P2 in conjunction with no bond with N1/P2 along with weak forces between P2 and N2, who knows what the particle accelerators will find?

The four fundamental forces of nature are: Strong and Weak nuclear forces, electromagnetic forces, and gravity: For more information, view: <http://hyperphysics.phy-astr.gsu.edu/hbase/particles/proton.html>

http://en.wikipedia.org/wiki/Fundamental_interaction

<http://www.egglescliffe.org.uk/physics/particles/mkquark/quarks.html>

<http://hyperphysics.phy-astr.gsu.edu/hbase/forces/funfor.html>

<http://aether.lbl.gov/elements/stellar/strong/strong.html>

http://www.vias.org/physics/bk4_03_04.html

A great book and easy to read is “Facts and Mysteries in Elementary Particle Physics” by Martinus Veltman

Fig 12

Helium Atom showing strong "stable" Internal Nuclear Forces and Electron Forces
Note: Assumes Neutrons can have reverse quark-charges

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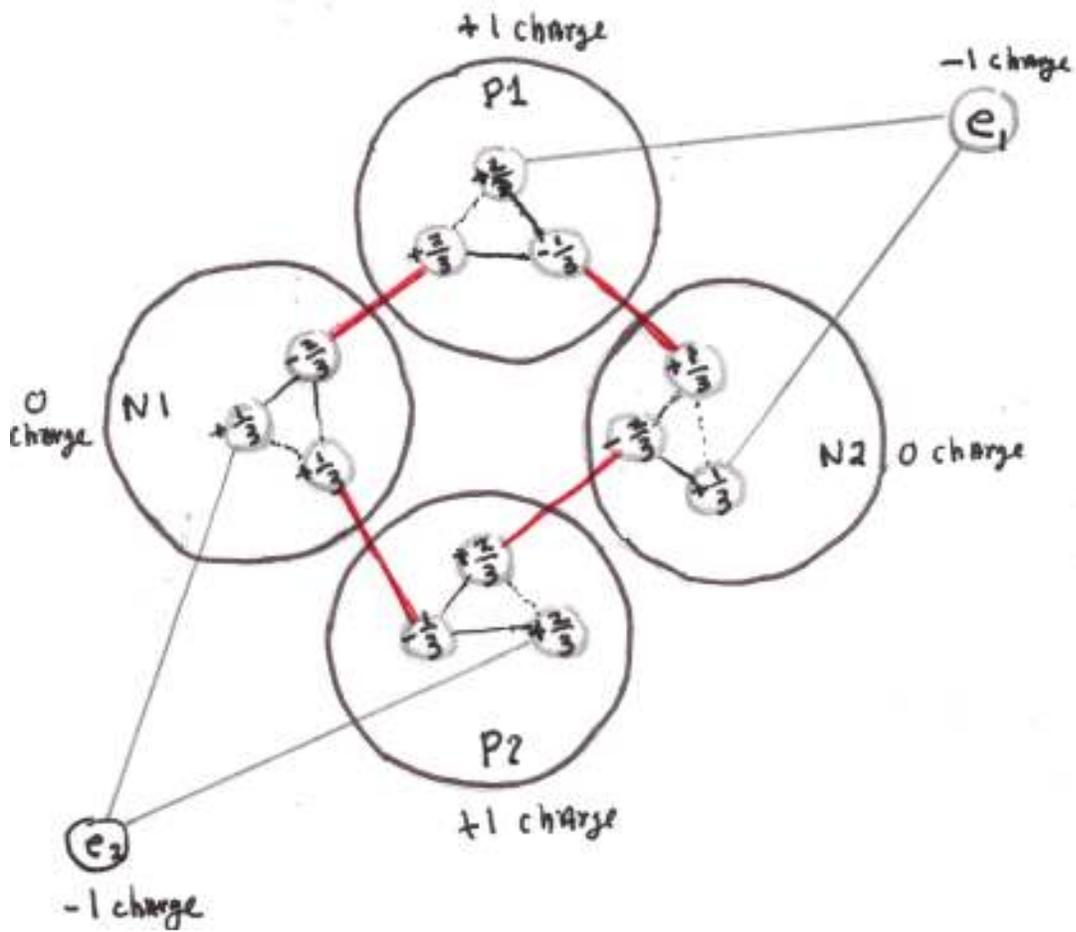


Fig 13

Helium Atom showing weaker internal Nuclear Forces and "stronger" Electron Forces on Neutron N2
Note: Assumes Neutron can have reverse quark-charges

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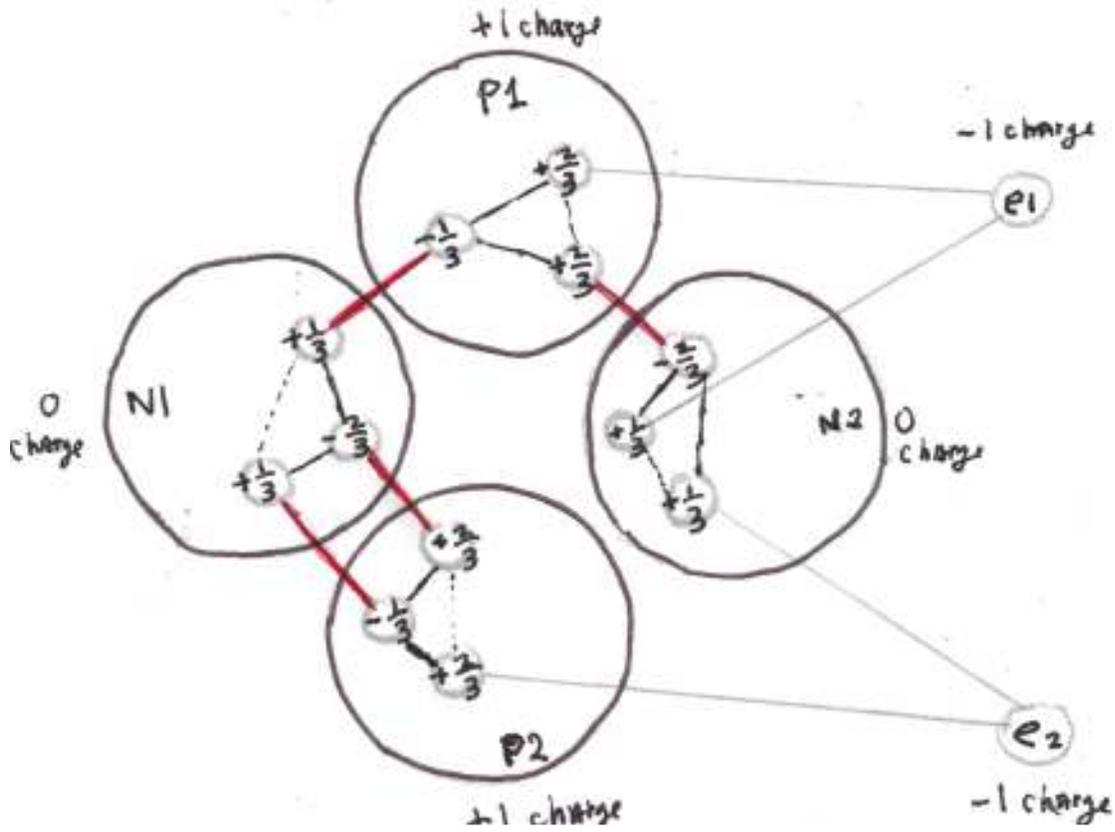
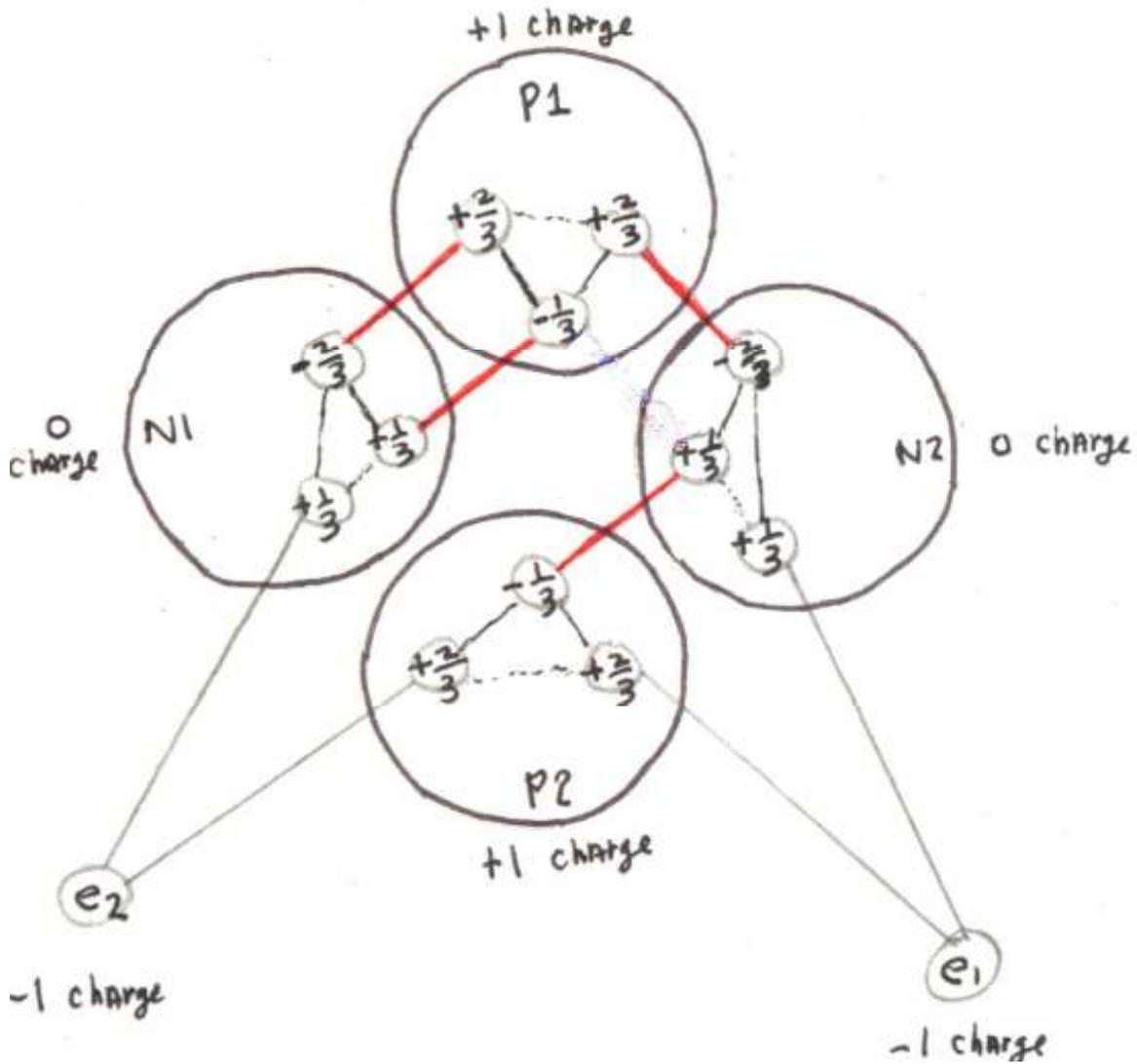


Fig 14

HELIUM ATOM showing weaker internal
Nuclear Forces and "stronger" Electron Forces on Proton P2
Note: Assumes Neutrons can have reverse quark-charges

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To: President Obama (via fax)

Oct. 24, 2010 p50

From: Tom Karras, senecare@aol.com, 301-353-9507
P.O. Box 1205, Germantown, MD 20875

Reference: www.KidsMathScienceDigitalBook.com

Subject: Suggestion for Planet Earth's 100 year plan

The global community needs to develop a 100 year plan and I am providing my input to you for your consideration to present at one of your upcoming global meetings.

The above reference website provides background information for why the "GODS SYSTEM-Global Operational Disaster System" should be implemented. We all know why we need to get our climate under control and get off fossil fuels.

We know that stars can explode such as the WR104 Star (gamma rays were detected about 1965) and this star appears to be pointed toward the Earth. Our Earth could be disintegrated within 8,000 years or even sooner (since we may not know when star explosions began) by gamma ray bursts which could be a million times more severe than our Sun's Corona Mass Ejection(CME); other stars may be or have already been identified which could pose similar threats. Note: Gamma ray bursts may have caused Mars to lose its atmosphere many years ago.

- 1.) Implement the GODS(Global Operational Disaster System) by 2025
- 2.) Get Earth's climate under control by 2030
- 3.) Convert most of Earth's energy to Solar, Nuclear, and Sun's Fusion*
Implementation on Earth by 2040
- 4.) Establish Moon Colonies by 2050*
- 5.) Establish Mars Colonies by 2075
- 6.) Establish Colonies on Potential Moons around Jupiter by 2090
- 7.) Establish Colonies on "Earth-Like Planets" or Other Moons by 3010

Note: We should "not burn any bridges" and should always be able to fall back to living in Colonies 4.) to 7.), including planet Earth. *See Page 38, a) Nuclear Fusion: Whoever controls the Moon with its Helium3 from the Sun could control a major future energy source for the Earth and to support future launches from the moon.

ACKNOWLEDGEMENTS p51

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