Wallingford Public Schools – MIDDLE SCHOOL COURSE OUTLINE

Course Title: Grade 8 General Science

Department: Science	**Grade(s)**: 8

Course Description

Students will explore physical, life, and earth science topics and the impact of science and technology on society. In the physical science strand, students will investigate the motion of objects and the forces that act upon them. The last unit focuses on introductory chemistry concepts related to the periodic table and simple bonding. Life science will focus on heredity, genetics and evolution. The earth science unit explores objects in the solar system. Students will also explore how structures must be designed and built considering the societal needs, available resources and environmental factors.

Required Instructional Materials	**Completion/Revision Date**
• Current and sufficient laboratory materials and equipment for each of the learning strands • Appropriate safety equipment – goggles, aprons, eyewash, safety shower, etc. • Information technologies – Internet and library resources	Approved by Board of Education June 16, 2005 Revisions Approved by Board of Education on November 16, 2009

Mission Statement of the Curriculum Management Team
The mission statement of the Science Curriculum Management Team is to promote scientific literacy emphasizing the process, content, and interdisciplinary nature of science.

Enduring Understandings for the Course
• Inquiry is the integration of process skills, the application of scientific content and critical thinking to solve problems.
• Science is the method of observation and investigation used to understand our world.
• The motion of an object can be described by its position, motion and speed.
• An object's inertia causes it to continue moving in its original direction unless it is acted upon by a force to change its speed and/or direction.
• When a centripetal force is applied to a moving object the object moves in a circular path.
• Heredity is the passage of instructions specifying traits from one generation to another.
• Reproduction is a characteristic of living systems and is essential for the continuation of every species.
• Advances in technology can change the process of natural human reproduction. The pros and cons of these advances can be debated.
• Some of the characteristics of an organism are inherited while others result from interactions with the environment.
• In nature, change is possible, inevitable, and sometimes beneficial.
• Science ideas evolve as new information is uncovered.
• Recognize that the solar system is part of a vast, expanding and constantly changing

universe which contains millions of galaxies.
• Gravity is the force that governs the motion of objects in the solar system.
• The solar system is composed of planets and other objects that orbit the sun in a regular and predictable motion.
• The motion of the Earth and Moon relative to the sun causes daily, monthly, and yearly cycles on Earth.
• Eclipses are caused by predictable alignment of the Earth, moon and sun.
• Seasons are caused by the Earth's tilt.
• Objects moving in circles must experience force acting toward the center.
• In the design of structures there is a need to consider factors such as function, materials, safety, cost and appearance.
• The strength of a structure is determined by its materials and shape.
• Structures must be designed and built considering the societal needs, available resources and environmental factors.
• The configuration of atoms and molecules determines the properties of materials.
• Atoms bond with one another to form new compounds.
• Acids and bases can be determined by their unique properties.
• Neutralization is a reaction between an acid and a base.

LEARNING STRAND

1.0 Scientific Reasoning and Communication Skills

NOTE: This learning strand should be taught through the integration of the other learning strands and is not meant to be taught in isolation as a separate unit.

ENDURING UNDERSTANDING(S)

- Inquiry is the integration of process skills, the application of scientific content and critical thinking to solve problems.
- Science is the method of observation and investigation used to understand our world.

ESSENTIAL QUESTION(S)

- How is inquiry used to solve problems or gather data to better understand a situation?
- How do scientists gather observations to find answers to questions?
- How does new knowledge gained create new questions?
- What are the characteristics of a controlled experiment?

LEARNING OBJECTIVES The student will:

1.1 Identify questions that can be answered through scientific investigation.
1.2 Read, interpret and examine the credibility of scientific claims in different sources of information.
1.3 Design and conduct appropriate types of scientific investigations to answer different questions.
1.4 Formulate a hypothesis in the 'If…., then…because…' format.
1.5 Identify independent and dependent variables, as well as those variables that are kept constant, and the control group.
1.6 Use appropriate tools and techniques to make observations, gather data, and organize information (tables and charts).
1.7 Use mathematical operations to analyze and interpret data including calculating the average for multiple trials.
1.8 Conduct measurements using the appropriate metric device and unit.
1.9 Identify and construct appropriate graphs illustrating the relationship between variables.
1.10 Draw conclusions and identify and explain at least three sources of error.
1.11 Provide explanations to investigated problems or questions.
1.12 Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.

INSTRUCTIONAL SUPPORT MATERIALS

- Sufficient laboratory instrumentation

SUGGESTED INSTRUCTIONAL STRATEGIES

- Performance tasks
- Open-ended labs
- Inquiry
- Modeling
- Hands-on, minds-on lab activities
- Computer created spreadsheets and graphs
- See other learning strands for integration
- Develop a well designed procedure that identify the independent and dependent variables, the need for controlling constant variables, the importance of multiple trials, the selection of appropriate materials, and development of a clear and logical directions

SUGGESTED ASSESSMENT METHODS

- Lab reports
- Open-ended questions
- Teacher observations
- Essays and/or compositions
- Research based projects
- Computer created spreadsheets and graphs
- See other learning strands for integration
- Experimental and content based open-ended/constructed response questions

1.13 Gather information using a variety of print and non-print sources. 1.14 Cite sources for print and non-print sources such as information located on the internet. 1.15 Analyze experimental design and data so as to identify the question investigated, variables, and sources of error. 1.16 Apply computer-based tools to present and research information. 1.17 Understand and demonstrate lab safety practices and procedures.	

LEARNING STRAND

2.0 Force and Motion

ENDURING UNDERSTANDING(S)

- The motion of an object can be described by its position, direction and speed.
- An object's inertia causes it to continue moving in its original direction unless it is acted upon by a force to change its speed and/or direction.
- When a centripetal force is applied to a moving object the object moves in a circular path.

ESSENTIAL QUESTION(S)

- Where can you find evidence of each of Newton's three Laws of Motion?
- What makes the objects move the way they do?
- What forces act on an object moving in a circular path?
- How are unbalanced and balanced forces related to an object's motion?
- What causes changes in motion?

LEARNING OBJECTIVES – The student will:

2.1 Calculate the average speed of a moving object. (C22)
2.2 Graph the motion of objects (distance over time). (C22 and inquiry)
2.3 Compare and contrast mass and weight. (C23)
2.4 Illustrate that objects at rest remain at rest and objects in motion remain in motion unless acted upon by an external force. (Newton's First Law) (C23)
2.5 Demonstrate how acceleration of an object is directly proportional to the net force and inversely proportional to its mass (F=ma). (Newton's Second Law) (C23)
2.6 Demonstrate that for every action there is an equal and opposite reaction. (Newton's Third Law) (C23)
2.7 Describe the forces acting on an object moving in a circular path. (C24)
2.8 Investigate variables that affect friction between two surfaces (CSDE Embedded Task – Shipping and Sliding).

INSTRUCTIONAL SUPPORT MATERIALS

- *Energy, Machines and Motion* science kit, STC, lessons 18-22
- *www.fearofphysics.com*
- Assorted cars, assorted spheres, stop watches, ramps, string
- Materials to create roller coasters

SUGGESTED INSTRUCTIONAL STRATEGIES

- **CSDE Embedded Task – Shipping and Sliding**
- Peer teaching
- Watch a 'Loony Tunes' cartoon and apply Newton's 3 laws and identify situations that defy Newton's 3 laws
- Apply Newton's laws to different sports
- Videos on Sports and Physics
- CAPT experimental constructed response warm-up '8.1 Speeding Up'
- Inquiry lab investigating different slopes, masses, size of object, etc. on the speed of an object - Investigate the speed of K'nex cars – change tire size, mass, etc.
- Object/car/roller coasters rolling down a ramp – measure and calculate speed, acceleration, graph distance vs. time, speed vs. time
- Mouse trap car, fan car and roller coaster to compare the average speed
- Compare and contrast the concepts of speed, velocity and acceleration.
- Give real life examples to demonstrate each of Newton's Laws of Motion

	• Inquiry investigation on 'Tops' • Apply Newton's Laws to explain why you should wear a seat belt in a moving car • Written, illustrative and oral explanations • Draw an example of each of Newton's Laws • Draw, label, and explain how centripetal force applies to how a washing machine spins clothes. (Car on race track, amusement park rides, orbit of planets, skater spinning, merry go-round, coriolis effect in north and south hemisphere, ocean currents, whirl pools, storms, etc.) • Calculate and graph the speed of roller coaster segments • Discuss different examples of momentum such as the force of a bike, force of a car, force of moving crustal plates • Investigate momentum using marbles with different masses and measuring speed **SUGGESTED ASSESSMENT METHODS** • Lab reports • Poster/presentation on Newton's Laws in sports • Graphs • Calculate and describe the qualitative relationships among force, mass, and changes in motion • Essay - As you ride a Merry-go-round, why do you have to hang on? • Write a persuasive letter to a president of an amusement park to convince him/her to choose your new ride to be built at the amusement park. Relate the 3 laws of motion to your designed ride; discuss safety features, use facts and data from classroom activities, etc. • Apply Newton's Three Laws of Motion to explain a given situation • Open-ended constructed response questions

LEARNING STRAND

3.0 Heredity and Evolution

ENDURING UNDERSTANDING(S)

- Heredity is the passage of instructions specifying traits from one generation to another.
- Reproduction is a characteristic of living systems and is essential for the continuation of every species.
- Advances in technology can change the process of natural human reproduction. The pros and cons of these advances can be debated.
- Some of the characteristics of an organism are inherited while others result from interactions with the environment.
- In nature, change is possible, inevitable, and sometimes beneficial.
- Science ideas evolve as new information is uncovered.

ESSENTIAL QUESTION(S)

- How do organisms inherit traits from their parents?
- How are males and females different?
- How is genetic information passed from generation from generation?
- How can you look more like a 'grandparent' than your parent?
- How/why do cells divide?
- What is the role of technology in changing natural human reproduction?
- What is the scientific evidence that supports evolution?
- Why/how do species change over time?

LEARNING OBJECTIVES – The student will:

3.1 Describe the structure and function of the male and female reproductive systems. (C26)
3.2 Explain the similarities and differences in cell division in somatic (mitosis) and germ cells (meiosis). (C25)
3.3 Describe the structure of DNA and its function. (C27)
3.4 Explain how a gene is the mechanism for the inheritance of traits. (C27)
3.5 Solve Punnett squares to determine patterns of inheritance and sex determination. (C27)
3.6 Explain how sexual reproduction results in genetic variability which leads to natural selection.
3.7 Discuss the relationship between speciation, natural selection, adaptation, and extinction.
3.8 Explain how the many pieces of scientific evidence support the theory of evolution.
3.9 Debate the technological issues related to genetic research (cloning, selective breeding, stem cell, genetically altered food, etc.)

INSTRUCTIONAL SUPPORT MATERIALS

- *Cells and Heredity*, Prentice Hall
- *Survive? An Event-Based Science Module*, Addison-Wesley, 1996.
- DNA extraction lab materials including microscopes and slides
- Pictures of different human phenotypes
- PTC paper, mirrors, paper bags
- Models of the female and male reproductive systems
- Models of mitosis and meiosis
- Prepared slides of yeast showing different phases of cell division
- Projection microscope
- *The Miracle of Life*, Nova video
- Brochures and assorted resources from American Cancer Society
- PBS videos on Evolution
- Discovery video on DNA evolution
- Marshmallows, rubber bands, paper clips, marbles, scissors, tweezers, spoons, rulers, stop watch, etc.
- Large and small marshmallows, thumb tacks, small nails, pipe cleaners, toothpicks

	SUGGESTED INSTRUCTIONAL STRATEGIES • Label diagram of human reproductive system, cell division, DNA, etc. • Write a 'story' (similar to *Baby Talk* video) that follows the life of a sperm and egg • Create a 3-D model of DNA and label parts • DNA extraction lab • Given the genotypes and phenotypes of the offspring, design a method to determine parent's genotypes and phenotypes • Use photographs to compare genetic traits • You are unique - take a class survey of student phenotypes such as tongue roller, widows peak, dimples, size of big toe, etc. • Create and solve Punnett squares • Explore the work of Watson and Crick, Rosalind Franklin, Gregor Mendel, Barbara McClintock, Linus Pauling, Human Genome Project, Charles Darwin, Alfred Wallace, etc. • Based on observable traits, suggest the potential traits of other parents • Peppered moth/ white mouse – case study – graph populations and explain what caused the changes in population • Probability lab – flip coin to 'randomly' determine the resulting genotype and phenotype of a given offspring • Create alien creatures with specific traits. In an "alien dating game," students pair one of their aliens with an alien from another student and determine the genotype and phenotype of their alien children (Science Scope, NSTA). • Research and present/ debate the pros and cons of cloning, selective breeding, stem cell, genetically altered food • STS - Science technology and society - research different genetic disorders - cancer - use graphic organizers to collect information • WebQuest • Guest speakers – doctors, genetic counselor, oncologist, etc. • Bird beak lab – analyze the structure of a 'beak' to the structure of the 'food' • Thumb lab – analyze and experience the hand structure of humans and primates

	• Camouflage lab – investigate how some 'species' are better adapted to an environment than other **SUGGESTED ASSESSMENT METHODS** • Open-ended/constructed response questions • Explain why a Punnett square effectively describes the process of meiosis and illustrate a specific example • Research projects and presentations • Lab reports • Punnett square problems • Tests/quizzes • Venn diagram comparing mitosis and meiosis • Released CAPT constructed response question – explain the adaptations for the created creature and predict its natural environment

LEARNING STRAND

4.0 Earth and the Solar System

ENDURING UNDERSTANDING(S)

- The solar system is part of a vast, expanding and constantly changing universe which contains millions of galaxies.
- Gravity is the force that governs the motion of objects in the solar system.
- The solar system is composed of planets and other objects that orbit the sun in a regular and predictable motion.
- The motion of the Earth and Moon relative to the sun causes daily, monthly, and yearly cycles on Earth.
- Eclipses are caused by predictable alignment of the Earth, moon and sun.
- Seasons are caused by the Earth's tilt.
- Objects moving in circles must experience force acting toward the center.
- Science ideas evolve as new information is uncovered.

ESSENTIAL QUESTION(S)

- Why do eclipses occur?
- What are the reasons for the seasons?
- Why are there different seasons on Earth? How do seasons change with different latitudes and in different hemispheres?
- How/why does the night sky change?
- What causes the phases of the moon?
- What causes tides?
- How does space research affect the quality of our lives?
- How do we investigate our solar system and other galaxies?
- What keeps a satellite in orbit?

LEARNING OBJECTIVES – The student will:

4.1 Explain the variables that affect gravity and orbital movement of planets and other objects in the solar system.
  - Mass
  - Distance
  - Centripetal force (orbits) (C28)

4.2 Explain the reasons for the seasons.
  - Axial tilt
  - Direct and indirect light rays
  - Altitude of the sun
  - Changing length of day light (C29)

4.3 Demonstrate how the motion of the Sun, Earth, and Moon align to explain the phases of the moon. (C29)

4.4 Illustrate the reasons for the change in tides.

4.5 Illustrate the relative positions of the sun, moon and Earth during eclipses. (C29)

4.6 Compare and contrast the characteristics of the planets in the solar system. (such as: rotation and revolution, composition of the atmosphere, surface gravity, satellites,

INSTRUCTIONAL SUPPORT MATERIALS

- *Astronomy*, Prentice Hall
- Planetarium visit
- Globes, styrofoam balls, flashlights
- Newspapers
- Basketball (Earth) , baseball (moon), string with diameter of 35 meters (sun)
- www.NASA.gov and other assorted educational materials from NASA
- *Asteroid! An Event-Based Science Module*, Addison-Wesley, 1996.
- www.webquest.com
- *Ninety Worlds and Counting,* Discovery video

SUGGESTED INSTRUCTIONAL STRATEGIES

- Use different lengths of string to demonstrate the relationship between distance from the sun and speed of revolutions
- Use the surface gravity of different planets to explore how a person's weight, jumping distance, and height would change on

size, mass, distance from sun, etc.) 4.7 Distinguish between asteroids, comets and meteors. (composition, origin, orbit, location, effect on the solar system, etc) 4.8 Explore how the space program provides new information about the solar system. 4.9 Identify characteristics of the sun and compare with other stars. (temperature, mass, volume, sun spots, flares, prominences, etc.)	different planets • Graph planetary distance vs orbital velocity • Graph the density of the planets vs distance from the sun and relate to a density column • Explore how gravity causes all objects to fall to the Earth at the same rate (9.8 m/s^2) – use spheres of different masses (same volume) • Investigate how a person's weight 'changes' on the scale in an elevator • Visit planetarium – 'Reasons for the Seasons' • Pre-assessment – students write in their journal their thinking about the reasons for the seasons – support with a labeled diagram • Investigate the effect of latitude on light intensity to explain temperature change • Use the newspaper to log the sun rise, sun set, moon cycle, tides • Create a model of the sun, moon and Earth to demonstrate the phases of the moon • Observe and log the phases of the moon • Demonstrate the phases of the moon using flashlights and Styrofoam balls • Identify the effects on tides given different positions of the sun, moon and Earth • Draw the relative positions of the sun, moon and Earth during the formation of eclipses • CAPT lab "Craters" • Debate whether we should continue to fund millions of dollars for space programs • Explore current events related to space science • Use a graphic organizer to compare asteroids, comets, and meteors • *Apollo 13* and *October Sky* videos • Graph the apparent size of the sun over a course of a year – model how the size of a light source changes with different distances • Read and analyze the short story for science concepts, *The Wind from the Sun*, Arthur C. Clarke – What is solar wind, solar flare, radiation, etc? • Research artificial satellites – what variables must be considered to produce a stable orbit – do artificial satellites stay in orbit forever? – what factors might

	contribute to an orbit's decay? – have any artificial satellites ever fallen to Earth? • Assorted WebQuests • Peer teaching • Compare and contrast seasons on Earth to the seasons on another planet (Neptune has a 90^{O} tilt) **<u>SUGGESTED ASSESSMENT METHODS</u>** • Released CAPT prompt "Reason for the Seasons" (2004) • Lab practical – various stations with different relative positions of the sun, moon and Earth – stations that ask questions on seasons, eclipse, tides, etc. • Analyze the scientific validity of a popular science fiction story or newspaper article • Model and explain different types of eclipse (full, partial and annular) • Explain why Columbian summers are hotter than summers in Connecticut • Compare the seasonal changes of the length of day and night for various places on Earth (Norway has 26 days of sunlight, Australia compared to Connecticut, Alaska, etc.) • Prepare an article for a student encyclopedia that explains phases, eclipse, and seasons • Create a space travel agency and 'sell' a vacation to a specific planet based on it's characteristics • A satellite is currently in a circular motion around Planet A. The same satellite was moved into a circular orbit of the same distance around Planet B. Planet B has twice as much mass as planet A. Describe how the speed of the satellite would have to change if it was to remain in circular motion? • A moon is currently in orbit around a planet. If the same moon were to move into an orbit twice its current radius, describe how the revolution speed of the moon would have to change? (may demonstrate with a string) • Why doesn't the Earth crash into the sun because of gravity between the sun and Earth? • Open-ended/constructed response questions

LEARNING STRAND

5.0 Structure and Materials of Bridges

ENDURING UNDERSTANDING(S)

- In the design of structures there is a need to consider factors such as function, materials, safety, cost and appearance.
- The strength of a structure is determined by its materials and shape.
- Structures must be designed and built considering the societal needs, available resources and environmental factors.

ESSENTIAL QUESTION(S)

- What forces affect a structure's ability to withstand stress?
- What are some principles of effective construction?
- What factors influence the strength and durability of a structure?
- What determines which type of bridge will be built?
- How do the needs and resources of society affect the construction of a bridge?

LEARNING OBJECTIVES – The student will:

5.1 Analyze the design principles of major bridge types (cable, suspension, truss, beam, arch). (C30)

5.2 Evaluate the benefits and drawbacks of bridge materials (wood, concrete, brick, aluminum, composites, etc.) (C30)

5.3 Evaluate forces that influence bridges and what engineers need to know before building a bridge. (C30)

INSTRUCTIONAL SUPPORT MATERIALS

- www.emints.org/ethemes/resources/S00001511.shtml
- www.civil.utah.edu/~blaser/MM_project/structures/types.htm
- www.asme.org/education/precollege/ideas/tpickbr.htm
- www.pbs.org/wgbh/nova/bridge/ Nova Building Bridges)
- www.ketchum.org/bridgecollapse.html (Galloping Gertie)
- Graph paper, rulers, popsicle sticks, pasta, aluminum foil, straws, toothpicks, skewers, paper clips, glue, masking tape, string, scissors
- Sample bridge materials such as wood, concrete, bricks, aluminum, steel, cables, etc.

SUGGESTED INSTRUCTIONAL STRATEGIES

- WebQuest on bridge structures and materials
- Test different materials (such as popsicle sticks, spaghetti, aluminum foil and wire) for how they behave under compression, stretching, bending, sliding and twisting www.pbs.org/wgbh/buildingbig/bridge/
- Research and report on a bridging structure - Compare and contrast your selected design with another student or group
- Guest speaker – structural engineer or urban planner
- STS – Science technology and society
  - New Haven's Quinnipiac bridge
  - Mianus River Bridge, Greenwich, CT,

	Interstate 95 collapse 1983 ○ Bridgeport Overpass Destroyed I-95, 2004 – rebuilding of overpass **SUGGESTED ASSESSMENT METHODS** • Develop a comprehensive bridge design plan for the CT River that includes a rational that addresses: ○ Design of bridge structure ○ Materials used ○ Safety considerations ○ Cost analysis ○ Appearance • Open-ended/constructed response questions • Research projects • Presentations • Lab reports • Tests/quizzes • Present to town council - best bridge design • Analyze the causes and consequences of a bridge collapsing

LEARNING STRAND

6.0 Introduction to Chemistry

NOTE: This learning strand must be taught last, after the CMT assessment. (Not on the 8th grade science CMT)

ENDURING UNDERSTANDING(S)

- The configuration of atoms and molecules determines the properties of materials.
- Atoms bond with one another to form new compounds.
- Acids and bases can be determined by their unique properties.
- Neutralization is a reaction between an acid and a base.

ESSENTIAL QUESTION(S)

- How does the chemical structure impact chemical change and reactivity?
- How are compounds formed?
- What does pH tell you about a solution?
- What happens in a neutralization reaction?

LEARNING OBJECTIVES – The student will:

6.1 Distinguish between chemical and physical changes based on properties. (C3)
6.2 Write correct chemical formulas and balance simple equations. (D11)
6.3 Explain how atoms combine to form new substances through ionic bonding (transferring electrons) and covalent bonding (sharing electrons). (D11)
6.4 Explain the chemical composition of acids and bases. (D12)
6.5 Investigate the pH of acids, bases and neutral substances. (D12)
6.6 Explain the change of pH of neutralization reactions. (D12)

INSTRUCTIONAL SUPPORT MATERIALS

- *Chemical Interactions*, Prentice Hall, 2000.
- Wall size periodic table
- Baking soda, vinegar, lemon juice, salt, drain cleaner, red cabbage juice, ammonia, glass cleaner, milk of magnesium, Tums, milk, soap, bleach, orange juice, soda, aspirin, etc.
- Magnesium ribbon, iron nails, matches, paper, scissors, hot plate, salt, pennies, etc.
- Various samples of elements and compounds,
- Goggles, litmus paper, pH paper, pH meters, phenolphthalein, universal indicator, well plates, dropper bottles, scales
- Hands-on models to represent bonding

SUGGESTED INSTRUCTIONAL STRATEGIES

- CAPT released lab – 'Fire Extinguisher' – investigate the amount of carbon dioxide produced during a neutralization reaction
- CAPT released lab – 'Soiled Again' – investigate the change in pH of 'acid rain' through different soil samples
- Inquiry lab – investigate which antacid is the most effective?
- Review the general structure of the atom, and explain how the properties of the first 20 elements in the Periodic Table are related to their atomic structure (6th grade)

	• Investigations involving chemical (burning, chemical reactions, etc) and physical (cutting, changing shape, etc.) changes • Describe the trends and periodicity of the periodic table – propose an alternative organization and support your reasoning • Use cabbage juice to test pH of different substances • Mystery soda lab – use phenolphthalein, vinegar, and ammonium • Research the uses and strength of different acids and bases • Demonstrate different chemical vs physical properties – flammability, ability to rust, size, color, shape, phase change • Demonstrate chemical vs physical changes – rusting, burning, cooking foods, baking bread, sour milk, melting wax, melting ice, tearing paper, cutting, mixing Kool-aid, **SUGGESTED ASSESSMENT METHODS** • Open-ended/constructed response questions • Research projects • Presentations • Lab reports • Tests/quizzes • Present to a business your recommendation for the most effective antacid • Acid/base lab practical • Atomic models of ionic or covalent compound

Wallingford Public Schools

Science Lab Report /Inquiry Report Grading Criteria Grades 8-12

Approved by Science Management Team October 3 and Curriculum Council October 24, 2006 (revised 2/09).

Your grade will reflect your understanding of key concepts and your ability to convey this understanding in a coherent, well-written report. Reports will be divided generally into the following sections, in order of appearance:

	Possible Points	Self	Tchr
Title includes the independent variable (IV) and dependent variable (DV) and other key words			
Problem is a question that describes the purpose or goal of the experiment. • Identifies one IV and one (or more) DV • Identifies at least 3 variables that are kept constant (CV)			
Hypothesis predicts how the IV should affect the DV and explains why this relationship is predicted. • Uses an "if….(IV)…then…..(DV)….because….." statement			
Procedure completely describes the experiment in a logical progression that can be replicated. • A specific list of equipment and **materials** that are needed including specific amounts, brands, sizes, kinds, etc. • It is a reliable and valid experimental design? Appropriate number of trials were used. • IV, DV, and variables that are kept constant are easily recognized. • The control is stated, if necessary.			
Data includes sufficient and accurate data. (Multiple trials, includes qualitative and quantitative observations, etc.) • Data is organized in a tabular form with an appropriate title. The table also includes column and row titles. Data is neat and in a meaningful order. • Appropriate units and/or calculations are included			
• An appropriate **graph** represents the data trends and includes: • Appropriate title • Dependent variable on the Y axis • Appropriate axis labels and units • Equally scaled axes • Data plotted accurately (averages were used, if applicable)			
A written **analysis** discusses: • Provide a written analysis or summary of the findings found in your data • Describe the trends, patterns, or relationship in your data (compare the IV to the DV) • If anything strange or unexpected happened during the experiment, you should mention these variables and how they may have affected your results.			
Conclusion addresses the specific relationship based upon the data. • Restate the hypothesis and state whether it is supported or unsupported by the data. • At least three different specific examples of data/observations are discussed to justify the conclusion. • If there is a control group, compare and contrast the results of the control group to the experimental group. • Discusses the limits or issues with the validity of the results. How much do you "trust" your results? (Discuss the range for each trial) • Discuss at least three different forms of scientific error AND how they may have impacted the results. • Given further time, what new question could be investigated? Identify the IV, DV and at least three CV.			
Overall – spelling, grammar, punctuation, neatness			
TOTAL			

8th Grade Science Curriculum Map Wallingford Public Schools

Revised April 28, 2008

SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY
Heredity 4 weeks	Heredity 4 weeks	Heredity (2 weeks) & Common assessment on Heredity Motion & Forces (2 weeks) 4 weeks	Motion & Forces 3 weeks	Shipping and Sliding Embedded Task Motion & Forces Common Assessment on Motion and Forces Bridges (1 week) 4 weeks
FEBRUARY	**MARCH**	**APRIL**	**MAY**	**JUNE**
Astronomy Start review 3 weeks	CMT Review Astronomy (2 weeks) Common assessment Astronomy 4 weeks	Evolution & Inquiry related to previous units 3 weeks	Chemistry 4 weeks	Chemistry 3 weeks