NORTH MAC MIDDLE SCHOOL

8th GRADE PHYSICAL SCIENCE

CURRICULUM GUIDE

Teacher: Richard Cooper

Grade Level: 8th grade

Course: Physical Science

Course Description: This is a hands-on course which teaches 8th grade students the Next Generation Science Standards in physics and chemistry. We will focus on studying concepts related to scientific inquiry, motion and forces, energy and matter, properties of matter, interactions of matter, and waves, electricity, and magnetism. The purpose of 8th Grade Science is to prepare students for high school science curriculum by using strategies aligned with the Common Core State Standards and the Next Generation Science Standards.

Textbook: Title: Physical I Science ISBN: 978-0-07-888004-9 Authors: Glencoe Publisher: McGraw-Hill Companies Publication Date: 2012

Assessment: Number of assessments and point values vary from quarter to quarter and are obtained from assignments, quizzes, chapter tests, labs, and projects. The percent values for assessment are as follows:

Assignments - 25%
Tests and quizzes - 50%
Projects - 25%

Content – 3 weeks	Assessment	Common Core	Essential Questions
Scientific Problem Solving	Daily Homework Quizzes Lab/Projects Tests	None	What are some steps used during science inquiry? What are the results of scientific inquiry? What is critical thinking? Why did scientists create the International System of Units (SI)? Why is scientific notation a useful tool for scientists? How can tools, such as graduated cylinders

			and triple-beam balances, assist physical scientists?
Content – 4 weeks	Assessment	Common Core	Essential Questions
Chapter 1 – Describing Motion & Chapter 2 – The Laws of Motion	Daily Homework Quizzes Lab/Projects Tests	MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. MS-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	How does the description of an object's position depend on a reference points? How can you describe the position of an object in two dimensions? What is the difference between distance and displacement? What is speed? How can you use a distance-time graph to calculate average speed? What are ways velocity can change? What are three ways an object can accelerate? What does a speed-time graph indicate about an object's motion? What are some contact forces and some noncontact forces? What is the law of universal gravitation? How does friction affect the motion of two objects sliding past each other? What is Newton's first law of motion? How is motion related to balanced and unbalanced forces? What effect does inertia have on the motion of an object?

Content – 4 weeks	Assessment	Common Core	Essential Questions
Chapter 5 – Energy and Energy Resources & Chapter 6 – Thermal Energy	Daily Homework Quizzes Lab/Projects Tests	MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.	What is energy? What are potential and kinetic energy? How is energy related to work? What are different forms of energy? What is the law of conservation of energy? How does friction affect energy transformations? How are different types of energy used? How are temperature and kinetic energy related? How do heat and thermal energy differ? What is the effect of having a small specific heat? What happens to a material when it is heated? In what ways can thermal energy be transferred?

Content – 4 weeks	Assessment	Common Core	Essential Questions
Chapter 7 – Foundations of Chemistry & Chapter 8 – States of Matter	Daily Homework Quizzes Lab/Projects Tests	MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.	What is a substance? How do atoms of different elements differ? How do mixtures differ from substance? How can you classify matter? What are some physical properties of matter? How are physical properties used to separate mixtures? How can a change in energy affect the state of matter? What happens when something dissolves? What is meant by conservation of mass? What is a chemical property? What are some signs of chemical change? Why are chemical equations useful? What are some factors that affect the rate of chemical reactions? How do particles move in solids, liquids, and gases? How are the forces between particles different in solids, liquids, and gases? How is temperature related to particle motion? How are temperature and thermal energy different? What happens to thermal energy when

			matter changes from one state to another? How does the kinetic molecular theory describe the behavior of a gas? How are temperature, pressure, and volume related in Boyle's law? How is Boyle's law different from Charles's law?

Content – 4 weeks	Assessment	Common Core	Essential Questions
Chapter 9 – Understanding the Atom & Chapter 10 – The Periodic Table	Daily Homework Quizzes Lab/Projects Tests	MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.	What is an atom? How would you describe the size of an atom? How has the atomic model changed over time? What happens during nuclear decay? How does a neutral atom change when its number of protons, electrons, or neutrons changes? How are elements arranged on the periodic table? What can you learn about elements from the periodic table? What elements are metals? What are the properties of metals? Where are nonmetals and metalloids on the periodic table? What are the properties of nonmetals and metalloids?

Content – 4 weeks	Assessment	Common Core	Essential Questions
Chapter 11 – Elements and Chemical Bonds & Chapter 12 – Chemical Reactions and Equations	Daily Homework Quizzes Lab/Projects Tests	MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.	How is an electron's energy related to its distance from the nucleus? Why do atoms gain, lose, or share electrons? How do elements differ from the compounds they form? What are some common properties of a covalent compound? Why is water a polar compound? What is an ionic compound? How do metallic bonds differ from covalent and ionic bonds? What are some signs that a chemical reaction might have occurred? What happens to atoms during a chemical reaction? What happens to the total mass in a chemical reaction? How can you recognize the type of chemical reaction by the number or type of reactants and products? What are the different types of chemical reactions? Why do chemical reactions always involve a change in energy? What is the difference between an endothermic reaction

			and an exothermic reaction? What factors can affect the rate of a chemical reaction?

Content – 4 weeks	Assessment	Common Core	Essential Questions
Chapter 14 – Carbon Chemistry	Daily Homework Quizzes Lab/Projects Tests	MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	How is carbon unique compared to other elements? How does carbon bond with other carbon atoms? What are the three common functional groups of organic compounds? What are polymers? What are biological molecules? What are some groups of carbon compounds found in living organisms?

Content – 3 weeks	Assessment	Common Core	Essential Questions
Chapter 15 – Waves	Daily Homework Quizzes Lab/Projects Tests	MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	What is a wave? How do different types of waves make particles of matter move? Can waves travel through empty space? What are properties of waves? How are the frequency and the wavelength of a wave related? What affects wave speed? How do waves interact with matter?

			What are reflection, refraction, and diffraction? What is interference?

Content – 2 weeks	Assessment	Common Core	Essential Questions
Chapter 17.3 – Electromagnetic Waves	Daily Homework Quizzes Lab/Projects Tests	MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	How are different types of electromagnetic waves used for communication? What are some everyday applications of electromagnetic waves? What are some medical uses of electromagnetic waves?

Content – 4 weeks	Assessment	Common Core	Essential Questions
Chapter 19 – Electricity & Chapter 20 – Magnetism	Daily Homework Quizzes Lab/Projects Tests	MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	How do electrically charged objects interact? How can objects become electrically charged? What is an electric discharge? What is the relationship between electric charge and electric current? What are voltage, current, and resistance? How do they affect each other? What are the basic parts of an electric circuit? How do the two types of electric circuits differ? What types of forces do magnets apply to other magnets?

			Why are some materials magnetic? Why are some magnets temporary while others are permanent? Why does a magnet apply a force on an electric current? How do electromagnets and permanent magnets differ? How do electric motors use magnets? How can a wire and magnet produce an electric current? How do electric generators create an electric current? How are transformers used to bring an electric current into your home?

Next Generation Life Science Standards:

MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.

MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

MS-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.