

Welcome to the 8th Grade Physical Science - AKA "Physics"

Teacher: Motamed Assisted by: Mrs. Yip

amotamed@stmatthewcath.org

Website: www.MrMTeachingMath.com

The Year of Understanding and Alignment with
the Common Core Objectives in Science
Through Labs and Connection With Algebra

Learning Focus / Student-Centered - Teaching Techniques;

- Direct Lessons
- Labs and Hands on Experiments
- "See the big picture" and think...
- Each student as a scientist
"What do you think?"
- Algebra Connection
- Group and In-Class Work and Practices
- One-on-One Guidance
- Peer-teaching
- Assessments as to reinforce learning and
Review of teaching effectiveness and Adjust.

Textbook: Physical Science, Holt Science & Technology

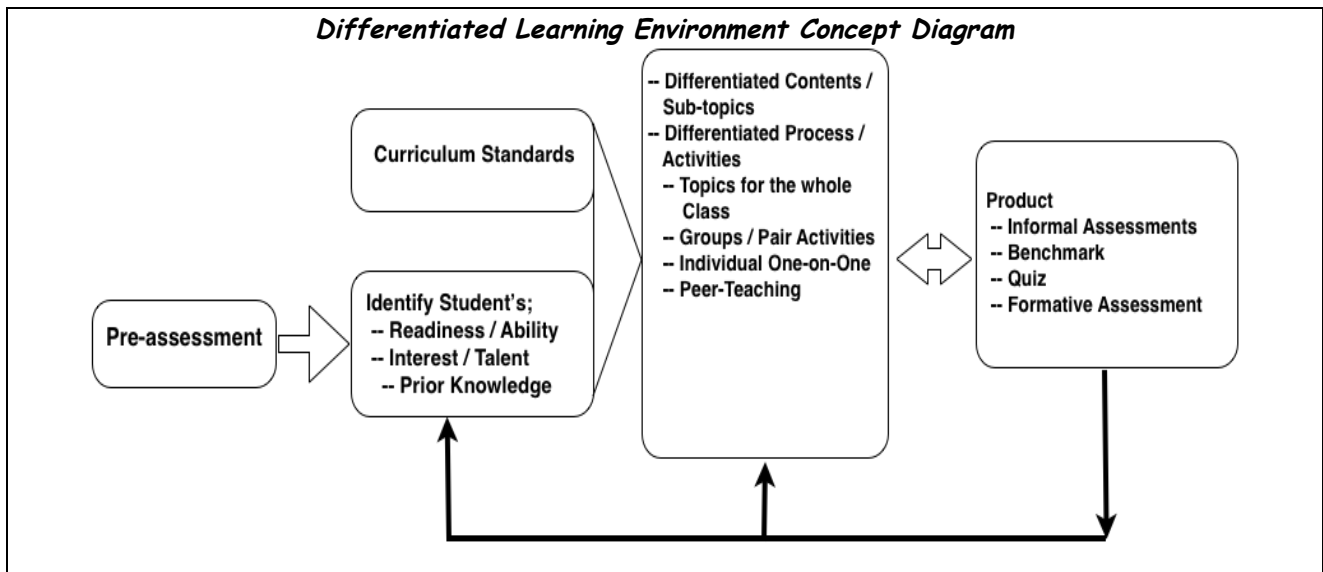
Course Description: 8th Grade- Physical Science is a collection of science topics specifically related to Physical Science, other wise known as "Physics". These topics include; States of Matter and their characteristics, Matter in Motion and Forces, Energy, Work, Introduction to Electricity, and Electro-magnetic waves and the interdependencies, Structure of Atom, Interactions of Matter and the introduction to chemistry, Periodic Table, and brief Astronomy and studies of planets.

Goals: Physical Science (Physics) - Students will learn to be curious and to become well-trained observant, to set up control experiments, test hypotheses, manage, run, and record experiments safely. Students will gain sufficient knowledge of Physics (some topics more in depth, and some topics in a broad sense) so that they are well prepared for High School Physics.

We will be utilizing the textbook, multi-media resources and handouts to teach and gain mastery of the Content Standards listed at the end of this document and learning to incorporate the common core requirements at they become available.

Differentiated Learning Environment and Instructions, Within Same Homeroom Classes:

Mr. Motamed, assisted by Mrs. Yip will be teaching Physics within the Differentiated Learning framework. Some students can be expected to gain the mastery of the material in a faster rate and in more in depth studies, while others may need more time to learn the basics and yet gain the mastery of the most fundamental materials. Our approach: "take time and slow down" make it learning focus, student-centered focus and make it enjoyable. Teach as much a possible to the individual student.



Physics Grading Scale 2013-2014:

- Unit Tests..... 30%
- Quizzes..... 25%
- Homework / In-Class Work..... 15%
- Lab 15%
- Project / Group Activity / Work 5%
- Participation / Conduct and Citizenship 5%
- Safety 5%

Late Policy:

Assignments are due on the specified due dates. We consciously give adequate time for the assignments including time to start the work in the classes. Therefore, for each late day, we will deduct 10% off the graded percent of an assignment. Late assignments after 5 school days (1 week) will receive **ZERO** point for that assignment. No work will be accepted more than one week (5 school days) after the required due date. Missing assignments can seriously affect the final grade and continuous missing work is considered an act of disobedient and will result in more severe consequences.

Attendance / Absence / Make-up Work Policy:

- If you miss a class, you are responsible for getting the notes, class work, and homework from your classmates or from the website. (will be available shortly)
- If you are absent for a test, you must make arrangements with us to reschedule the test as soon as you return to the school. Rescheduling is your own responsibility.
- All class information will be available online. (shortly)
- Being tardy is extremely disturbing to the class. You will loose part of your daily participation points for each tardy.
- Your attendance for the full length of all class periods is vital.

Daily Homework:

- Homework will be given daily (except Friday) and checked on the next day, unless otherwise specified.
- Homework serves as a review and practice of the day's lesson. On average you should expect to spend 30 to 45 minutes on homework.
- Homework must have the correct heading:
Your full name, Homework Number, Date, Period

Participation / Note-taking / Organization / Conduct / Citizenship:

- Each student will automatically receive 3 points for this category daily. Every time you are late to class, misbehave, fail to follow directions, or are not on task, one point will be deducted from your daily participation grade.

Quizzes / Tests / Group Tests

- Quizzes / tests will be given almost once a week.
- Calculators are allowed on the tests or quizzes unless specified by us.
- Some tests will be completed in groups and others will be individually.
- Group tests generally will be prior to the chapter or unit test.
- Chapter tests will be given at the end of each chapter.
- We will provide guidance and practice worksheets prior to the chapter / unit test.

Classroom Rules:

- School policies on behavior fully apply in this class.

8th Grade – Physical Science - AKA “Physics”

Syllabus

Learning Focus – Teaching Techniques;

- Direct Lesson
- Lab
- Algebra Connection
- Group and In-Class Work and Practices
- One-on-One Guidance
- Peer-teaching
- Assessments as to reinforce learning and Review of teaching effectiveness and Adjust.

1) UNIT 1: INTRODUCTION TO MATTER

a) Chapter 2 – The Properties of Matter

(1) “Properties of Matter” – streaming video (18:01)

ii) What is Matter?

(1) Volumania! – skill builder/ experiment

(a) **Standard 3:** Each of the more than 100 elements have distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for understanding this concept students will

- (i) Know the structure of the atom and know it is composed of protons, neutrons, and electrons
- (ii) Know that compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements
- (iii) Know atoms and molecules form solids by building up repeating patterns, such as, the crystal structure of NaCl or long chain polymers
- (iv) Know the states of matter (solid, liquid, gas) depend on molecular motion
- (v) Know that in solids the atoms are closely locked in position and can only vibrate; in liquids the atoms and molecules are more loosely connected

and can collide with and move past one another; and in gases the atoms and molecules are free to move independently, colliding frequently

(vi) Know how to use the periodic table to identify elements in simple compounds

iii) Describing Matter

(1) [White Before Your Eyes – skill builder/ experiment \(pg. 524\)](#)

(2) [Virtual Explorations](#)

(a) [Mobile Matters, Just Dunk It, Sink or Float](#)

b) Chapter 3 – States of Matter

i) Four States of Matter

(1) [“States of Matter” – streaming video \(20:00\)](#)

(2) [Determining Density – skill builder experiment](#)

ii) Changes of State

(1) [“Phases of Matter” – streaming video \(18:04\)](#)

(2) Create your own matter board game ☺ ...and play it!

(3) [“Chemical Changes” – mythbusters \(12:08\)](#)

(4) [Virtual Explorations](#)

(a) [Changes of State](#)

(5) [A Bag of Slime – experiment](#)

c) Chapter 4 – Elements, Compounds, and Mixtures

i) Elements

(1) [Dense Suspense – Teacher led demonstration](#)

(2) [“The Elements” – streaming video \(56:00\)](#)

ii) Compounds

iii) Mixtures

(1) [Making Butter – experiment](#)

(2) [Virtual Explorations](#)

(a) [All Mixed Up](#)

2) UNIT 4: THE ATOM

a) Chapter 12 – Introduction to Atoms

(a) **Standard 6:** Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept students will

- (i) Know that carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms
- (ii) Know that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur
- (iii) Know that living organisms have many different kinds of molecules, including small ones, such as water and salt, and very large ones, such as carbohydrates, fats, proteins, and DNA

ii) Development of the Atomic Theory

iii) The Atom

(1) [Made to Order – making models/ experiment \(pg. 570\)](#)

(2) [“Atom: Building Blocks of Matter” – streaming video \(20:00\)](#)

(3) [Virtual Explorations](#)

(a) [Build an Atom, Where Do I Belong?](#)

b) Chapter 13 – The Periodic Table

(a) **Standard 7:** The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept students will

- (i) Know how to identify regions corresponding to metals, nonmetals, and inert gases
- (ii) Know each element has a specific number of protons in the nucleus (the atomic number) and each isotope of the element has a different but specific number of neutrons in the nucleus
- (iii) Know substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity

(2) [“Atomic Structure and the Periodic Table” – streaming video \(17:23\)](#)

ii) Arranging the Elements

(1) [“Striving the Elements” – streaming video \(23:53\)](#)

iii) Grouping the Elements

(1) Elements T-shirt project

(a) [Research element](#)

(2) [Chemistry Internet Activities](#)

(a) Interactive Periodic Table

3) UNIT 5: INTERACTIONS OF MATTER

a) Chapter 14 – Chemical Bonding

i) Electrons and Chemical Bonding

(1) "Chemical Bonding" – streaming video (18:46)

(2) "Elements" – streaming video (20:00) after 33

ii) Types of Chemical Bonds

(1) Covalent Marshmallows – making models/ experiment (pg. 574 done by me in front of class)

(2) Bond with a Classmate – experiment

(3) Virtual Explorations

(a) Compounds: The Bonds that Bind, Molecules and Compounds




b) Chapter 15 – Chemical Reactions

(1) "Chemical Reactions" – streaming video (18:01)

ii) Forming New Substances

iii) Types of Chemical Reactions

(1) Practice balancing chemical equations

   Balancing chemical equations contest! 😊

(a) **Standard 5:** Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept students will

(i) Know reactant atoms and molecules interact to form products with different chemical properties

(ii) Know the idea of atoms explains the conservation of matter: in chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same

(iii) Know chemical reactions usually liberate heat or absorb heat

(iv) Know physical processes include freezing and boiling, in which a material changes form without chemical reaction

(v) Know how to determine whether a solution is acidic, basic or neutral

(3) Disease Detectives – experiment

iv) Energy and Rates of Chemical Reactions

c) Chapter 16 – Chemical Compounds (Shortened Chapter)

(1) "Compounds & Reactions" – streaming video (20:00)

(2) "Acids, Bases, & Salts" – streaming video (20:00)

(3) Cabbage Patch Indicators – skill builder lab

(4) Chemistry Internet Activities

(5) Virtual Explorations

(a) Mixing Acids and Bases, The Mystery of Potter's Pond Simulation

4) UNIT 2: MOTION AND FORCES

(a) **Standard 9:** Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept

and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will

(i) Plan and conduct a scientific investigation to test a hypothesis

(ii) Evaluate the accuracy and reproducibility of data

(iii) Distinguish between variable and controlled parameters in a test

(iv) Recognize the slope of the linear graph as the constant in the relationship $y = kx$ and apply this principle in interpreting graphs constructed from data

(v) Construct appropriate graphs from data and develop quantitative statements about the relationships between variables

(vi) Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure x area, volume = area x height)

(vii) Distinguish between linear and nonlinear relationships on a graph of data

(2) Video Projects

b) Chapter 5 – Matter in Motion

(1) Built for Speed – experiment (pg. 536)

(a) **Standard 1:** The velocity of an object is the rate of change of its position. As a basis for understanding this concept students will

(i) Know position is defined in relation to some choice of a standard reference point and a set of reference directions.

- (ii) Know that average speed is the total distance traveled divided by the total time elapsed and that the speed of an object along the path traveled can vary.
- (iii) Know how to solve problems involving distance, time, and average speed.
- (iv) Know the velocity of an object must be described by specifying both the direction and the speed of the object.
- (v) Know changes in velocity may be due to changes in speed, direction, or both.
- (vi) Know how to interpret graphs of position versus time and graphs of speed versus time for motion in a single direction.

ii) Measuring Motion

(1) "Speed and Acceleration" – streaming video (9:05)

iii) What is a Force?

(a) **Standard 2:** Unbalanced forces cause changes in velocity. As a basis for understanding this concept students will

- (i) Know a force has both direction and magnitude
- (ii) Know when an object is subject to two or more forces at once, the result is the cumulative effect of all forces
- (iii) Know when the forces on an object are balanced, the motion of the object does not change
- (iv) Know how to identify separately the two or more forces that are acting on a single static object, including gravity, elastic forces due tension or compression in matter, and friction
- (v) Know that when the forces on an object are unbalanced, the object will change its velocity (that is, it will speed up, slow down, or change direction)
- (vi) Know the greater the mass of an object are unbalanced, the more force is needed to achieve the same rate of change in motion
- (vii) Know the toll of gravity in forming and maintaining the shapes of planets, stars, and the solar system

iv) Friction: A Force that Opposes Motion

(1) "Friction and Energy Transformation" – streaming video (6:33)

(2) "Decreasing Friction: Reducing Resistance" – streaming video (12:07)

(3) Science Friction – discovery lab/ experiment (pg. 540)

v) Gravity: A Force of Attraction

(1) "Exploring Gravity" – streaming video (18:36)

(2) Virtual Explorations

(a) Lose Weight Without Dieting, Slippery Slope, Need for Speed, Going Round & Round, & Speedy Lube

c) Chapter 6 – Forces in Motion

☎🇺🇸🇺🇸 Great America Physics Day! 😊

1. The work done on this field trip is also the class final.

ii) Gravity and Motion

iii) Newton's Laws of Motion

(1) On the Fast Track – inquiry lab/ experiment

(2) "Exploring the Laws of Motion" – streaming video (21:16)

(3) "Freefall" – mythbusters (18:00)

(4) "Inertia" – mythbusters (18:00)

(5) Virtual Explorations

(a) Projectile Motion Simulation, On the Move

d) Chapter 7 – Forces in Fluid

(a) **Standard 8:** All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept students will

(i) Know density is mass per unit of volume

(ii) Know how to calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume

(iii) Know the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced

(iv) Know how to predict whether an object will float or sink

ii) Fluids and Pressure

iii) Buoyant Force

(1) Fluids, Force, and Floating – inquiry lab/ experiment

(2) "Buoyancy and the Titanic" – streaming video (8:35)

(3) "Water Displacement" – mythbusters (16:00)

(4) "Buoyancy" – mythbusters (18:00)

5) UNIT 6 – INTRODUCTION TO ASTRONOMY

a) Chapter 17 – Formation of the Solar System (Shortened Chapter)

(a) **Standard 4:** The structure and composition of the universe can be learned from the studying stars and galaxies, and their evolution. As a basis for understanding this concept students will

- (i) Know galaxies are clusters of billions of stars and may have different shapes
- (ii) Know that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color
- (iii) Know how to use astronomical units and light years as measures of distances between the Sun, stars, and Earth
- (iv) Know that stars are the source of light for all bright objects in outer space and that the Moon and planets shine by reflected sunlight, not by their own light
- (v) Know the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids

[\(2\) How Far Is the Sun? – discovery lab/ experiment \(pg. 586\)](#)

[\(3\) "How the Solar System Works – streaming video \(15:00\)](#)

[\(4\) "Solar System & Beyond" – streaming video \(25:00\)](#)

[\(5\) "Our Amazing Sun" – streaming video \(26:00\)](#)

[\(6\) Milky Way Part 1" – streaming video \(22:47\)](#)

[\(7\) "The Universe" – streaming video \(28:43\)](#)

b) Chapter 18 – A Family of Planets (Shortened Chapter)

[\(1\) Measuring Space – outside activity \(pg. 451\)](#)

[\(2\) "When Worlds Collide" – streaming video \(4:36\)](#)

[\(3\) "The Inner Planets" – streaming video \(15:00\)](#)

[\(4\) "The Outer Planets" – streaming video \(15:00\)](#)

[\(5\) "Other Heavenly Bodies: Asteroids, Meteors, and Comets" – streaming video \(2:16\)](#)

c) Chapter 19 – The Universe Beyond (Shortened Chapter)

[\(1\) A Look at the Stars" – streaming video \(15:00\)](#)

[\(2\) Constellation Prize – inquiry lab/ experiment](#)

[\(a\) Done at home](#)

(3) "The Life Cycle of Stars" – streaming video (3:12)

(4) "Astronomy" – streaming video (40:00)

(5) Project Space – WebQuest

(6) Virtual Explorations

(a) A Star's Life, How Big is Big, The Sun, Planets of the Solar System

(7) Astronomy Games

Grade Eight California Science Content Standards Focus on Physical Science (Physics)

Motion

1. The velocity of an object is the rate of change of its position. As a basis for understanding this concept:
 - a. Students know position is defined in relation to some choice of a standard reference point and a set of reference directions.
 - b. Students know that average speed is the total distance traveled divided by the total time elapsed and that the speed of an object along the path traveled can vary.
 - c. Students know how to solve problems involving distance, time, and average speed.
 - d. Students know the velocity of an object must be described by specifying both the direction and the speed of the object.
 - e. Students know changes in velocity may be due to changes in speed, direction, or both.
 - f. Students know how to interpret graphs of position versus time and graphs of speed versus time for motion in a single direction.

Forces

2. Unbalanced forces cause changes in velocity. As a basis for understanding this concept:
 - a. Students know a force has both direction and magnitude.
 - b. Students know when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces.
 - c. Students know when the forces on an object are balanced, the motion of the object does not change.
 - d. Students know how to identify separately the two or more forces that are acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction.
 - e. Students know that when the forces on an object are unbalanced, the object will change its velocity (that is, it will speed up, slow down, or change direction).
 - f. Students know the greater the mass of an object, the more force is needed to achieve the same rate of change in motion.
 - g. Students know the role of gravity in forming and maintaining the shapes of planets, stars, and the solar system.

Structure of Matter

3. Each of the more than 100 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for understanding this concept:
 - a. Students know the structure of the atom and know it is composed of protons, neutrons, and electrons.
 - b. Students know that compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements.

- c. Students know atoms and molecules form solids by building up repeating patterns, such as the crystal structure of NaCl or long-chain polymers.
- d. Students know the states of matter (solid, liquid, gas) depend on molecular motion.
- e. Students know that in solids the atoms are closely locked in position and can only vibrate; in liquids the atoms and molecules are more loosely connected and can collide with and move past one another; and in gases the atoms and molecules are free to move independently, colliding frequently.
- f. Students know how to use the periodic table to identify elements in simple compounds.

Earth in the Solar System (Earth Sciences)

4. The structure and composition of the universe can be learned from studying stars and galaxies and their evolution. As a basis for understanding this concept:
 - a. Students know galaxies are clusters of billions of stars and may have different shapes.
 - b. Students know that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color.
 - c. Students know how to use astronomical units and light years as measures of distances between the Sun, stars, and Earth.
 - d. Students know that stars are the source of light for all bright objects in outer space and that the Moon and planets shine by reflected sunlight, not by their own light.
 - e. Students know the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids.

Reactions

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept:
 - a. Students know reactant atoms and molecules interact to form products with different chemical properties.
 - b. Students know the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.
 - c. Students know chemical reactions usually liberate heat or absorb heat.
 - d. Students know physical processes include freezing and boiling, in which a material changes form with no chemical reaction.
 - e. Students know how to determine whether a solution is acidic, basic, or neutral.

Chemistry of Living Systems (Life Sciences)

6. Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept:
 - a. Students know that carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms.
 - b. Students know that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur.

- c. Students know that living organisms have many different kinds of molecules, including small ones, such as water and salt, and very large ones, such as carbohydrates, fats, proteins, and DNA.

Periodic Table

7. The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept:
 - a. Students know how to identify regions corresponding to metals, nonmetals, and inert gases.
 - b. Students know each element has a specific number of protons in the nucleus (the atomic number) and each isotope of the element has a different but specific number of neutrons in the nucleus.
 - c. Students know substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity.

Density and Buoyancy

8. All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept:
 - a. Students know density is mass per unit volume.
 - b. Students know how to calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.
 - c. Students know the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced.
 - d. Students know how to predict whether an object will float or sink.

Investigation and Experimentation

9. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
 - a. Plan and conduct a scientific investigation to test a hypothesis.
 - b. Evaluate the accuracy and reproducibility of data.
 - c. Distinguish between variable and controlled parameters in a test.
 - d. Recognize the slope of the linear graph as the constant in the relationship $y=kx$ and apply this principle in interpreting graphs constructed from data.
 - e. Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.
 - f. Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure \times area, volume = area \times height).
 - g. Distinguish between linear and nonlinear relationships on a graph of data.