

---

## Course Description

**Subject:** SCIENCE

**Grade:** 8

### Overview:

Eighth grade science is a core academic course that meets every day for the entire year. The focus is on physical science and includes introductory topics in physics and chemistry. Instruction includes group and individual laboratory investigations as well as individual "home" projects. Science is presented as a valuable, but not infallible, tool for observing the physical world and a method of problem solving using the scientific method.

### Primary Biblical Integration:

I Corinthians 14:40-"Let all things be done decently and in order."

"Lord, you have made many things. With your wisdom You made them all. The earth is full of your riches." Psalm 104:24

### Unit Description:

- 1) **HOW TO BE SUCCESSFUL IN EIGHTH GRADE SCIENCE.** This introductory unit will explain to the student what is expected of him/her in the sense of participation, homework, quizzes, projects, and benchmarks.
- 2) **INVESTIGATION AND EXPERIMENTATION:** The scientific method is a proven system for scientific investigation.
- 3) **MOTION.** All motion is relevant to a frame of reference. Students will be able to find average speed by using distance and time. To describe the velocity of motion, speed and direction must be used. Changes in velocity are acceleration, deceleration, and change of direction.
- 4) **FORCES.** A force has both direction and magnitude. Unbalanced forces cause changes in velocity. Students will understand that forces have magnitude and direction and may be unbalanced and balanced. Students will understand that when more than one force acts upon an object, the effect is the cumulative effect of all the forces.
- 5) **DENSITY AND BOUYANCY.** Density is found by dividing mass by volume. The object's mass and density determine certain physical characteristics such as buoyancy.
- 6) **CHEMISTRY.** Elements have their own individual, unique molecular properties, both physical and chemical. Elements will react according to molecular structure.
- 7) **PERIODIC TABLE:** The organization of the periodic table is based upon the properties of the elements.
- 8) **THE STRUCTURE OF MATTER.** Elements have distinct patterns of arrangement having a nucleus and a shell. Each element has different numbers protons and electrons.
- 9) **REACTIONS:** Chemical reactions are processes in which atoms are rearranged into different combinations of molecules.

### Student Materials:

Motion, Forces, and Energy SE, Prentice Hall, 2005, 0131150995

Chemistry of Matter SE, Prentice Hall, 2005, 0131150960

### Teacher Materials:

Motion, Forces, and Energy TE, Prentice Hall, 2005, 0131811320

Motion, Forces, and Energy All In One Resource, Prentice Hall, 2005,

Motion, Forces, and Energy Transparencies, Prentice Hall, 2005,

Chemistry of Matter TE, Prentice Hall, 2005, 0131811304

Chemistry of Matter All In One Resource, Prentice Hall, 2005,

Chemistry of Matter Transparencies, Prentice Hall, 2005,

# HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

# COURSE OUTLINE

Teacher's Name: <b>ESTES</b>		Subject: SCIENCE 8		# of Quarters: 4	
Text (if any): <b>PEARSON PRENTICE HALL <u>FOCUS ON CALIFORNIA PHYSICAL SCIENCE, 2008</u></b>			Other Materials: <b>PEARSON PRENTICE HALL <u>FOCUS ON CALIFORNIA PHYSICAL SCIENCE SUPPLEMENTAL AND SE,2008</u></b>		
Recurring Themes, Principles, Skills or Concepts:	1) The Scientific Method is a proven system for problem solving and investigation.	2) Science is restricted to what can be observed and tested. It is a useful but not infallible tool for investigation.	3) There are laws in science that have been proven and are at work in the universe today.	4) Each element has its own unique structure and may react with other elements or energy to form new substances.	5) Motion and force have velocity and direction. Force is the cumulative effect of all forces acting on an object.
Unit Title & Expected Start Date	Theme	Biblical Application	Key Concepts		
1) INTRODUCTION TO THE CLASS AND POLICIES/PROCEDURES	THERE ARE EXPECTATIONS OF EVERY STUDENT, BASED BOTH GENERALLY AND INDIVIDUALLY	1 COR. 14:40-"LET ALL THINGS BE DONE DECENTLY AND IN ORDER"	HOW TO SUCCEED IN 8TH GRADE SCIENCE		
2) INVESTIGATION AND EXPERIMENTATION	THE SCIENTIFIC METHOD IS A PROVEN PROBLEM SOLVING TECHNIQUE	Ps. 104:24-"Lord, you have made many things. With your wisdom you made them all."	CDE 9. INVESTIGATION AND EXPERIMENTATION: SCIENTIFIC PROGRESS IS MADE BY ASKING MEANINGFUL QUESTIONS AND CONDUCTING CAREFUL, ORDERLY INVESTIGATIONS.		
3)STRUCTURE OF MATTER	THE UNIVERSE IS ONLY MATTER AND ENERGY. ALL MATTER IS COMPOSED OF ONE OR MORE ELEMENTS.	JOHN 1:3-"And all things were created by Him and without Him nothing was made that was made"	CDE 3. STRUCTURE OF MATTER: EACH OF THE MORE THAN 100 ELEMENTS OF MATTER HAS DISTINCT PROPERTIES AND A DISTINCT ATOMIC STRUCTURE.		
4) REACTIONS	CHEMICAL REACTIONS ARE PROCESSES IN WHICH MOLECULAR STRUCTURE IS REARRANGED INTO DIFFERENT COMBINATIONS	PROV. 26:20-"Where there is no wood, the fire goes out; and where there is no talebearer, strife ceases.	CDE 5. REACTIONS: CHEMICAL REACTIONS ARE PROCESSES IN WHICH ATOMS ARE REARRANGED INTO DIFFERENT COMBINATIONS OF MOLECULES		
5) CHEMISTRY OF LIVING THINGS	CARBON COMBINES WITH OTHER ELEMENTS TO FORM MOLECULES ESSENTIAL TO LIVING ORGANISMS	GEN. 2:7-"And the Lord God formed man out of the dust of the earth and breathed life into him and man became a living soul"	CDE. 6 CHEMISTRY OF LIVING SYSTEMS: PRINCIPLES OF CHEMISTRY UNDERLIE THE FUNCTIONING OF BIOLOGICAL SYSTEMS.		
6) PERIODIC TABLE	THE ORGANIZATION OF THE PERIODIC TABLE IS BASED ON THE PROPERTIES OF THE MOLECULAR STRUCTURE OF THE ELEMENT	GEN. 1:1-31	CDE 7. PERIODIC TABLE: THE ORGANIZATION OF THE PERIODIC TABLE IS BASED ON THE PROPERTIES OF THE ELEMENTS AND REFLECTS THE STRUCTURE OF ATOMS.		
7) MOTION	MOTION IS DEFINED AS IT RELATES TO A POINT OF REFERENCE. IT MAY HAVE VELOCITY. SPEED=DISTANCE/TIME	GEN. 1:1-31	CDE. 1. THE VELOCITY OF AN OBJECT IS THE RATE OF CHANGE OF ITS POSITION		
8)FORCES	Forces have direction and magnitude. Unbalanced forces cause change in direction. Force is the cumulative effect of all forces	GEN. 1:1-"In the beginning, God created the heavens and the earth"	CDE. 2. FORCES HAVE DIRECTION AND MAGNITUDE AND ACT UPON OBJECTS.		
9) DENSITY AND BUOYANCY	ALL OBJECTS HAVE BUOYANCY	GEN. 1:1-31	CDE. 8-ALL OBJECTS EXPERIENCE A BUOYANT		
10)					

# HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

# UNIT PLANNER

Teacher's Name:	ESTES	Subject:	SCIENCE 8	Period(s):	1-5
-----------------	-------	----------	-----------	------------	-----

Unit #:	1	Dates - Starting:	WEEK 1	Ending:	WEEK 2	Total Instructional Days:	5
---------	---	-------------------	--------	---------	--------	---------------------------	---

Unit Title: BEING SUCCESSFUL AT HCJH

Theme: THERE ARE EXPECTATIONS OF EVERY STUDENT, BOTH GENERALLY AND INDIVIDUALLY

Biblical Application: 1 COR. 4:40-LET ALL THINGS BE DONE DECENTLY AND IN ORDER

Key Concepts	Standards/Sub-Strands	Outcomes	Assessment	ESLRs
HOW TO SUCCEED IN 8TH GRADE SCIENCE		STUDENTS WILL DEMONSTRATE AN UNDERSTANDING ON SUCCEEDING	QUIZ	1c. 2a. 2b.3b.3c.
2)				
3)				
4)				
5)				

Key Activities and Methods

# HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

# UNIT PLANNER

Teacher's Name: ESTES		Subject: SCIENCE 8		Period(s): 1-3,5		
Unit #: 2	Dates - Starting: Week #3		Ending: Week #35 (ongoing)	Total Instructional Days:		
Unit Title: INVESTIGATION AND EXPERIMENTATION						
Theme: What is physical science and how do scientists measure the physical world?						
Biblical Application: Ps. 104:24-Lord, you have made many things. With your wisdom you made them all.						
Key Concepts		Standards/Sub-Strands		Outcomes	Assessment	ESLRs
Investigation and Experimentation is an ongoing, year-long process		9a. Plan and conduct a scientific investigation to test an hypothesis		Students will plan and conduct an investigation to prove/disprove a hypothesis	class project, authentic assessment	2a.2b.2d.2e .3a.4b.5d
Distinguishing between variables and parameters in graphs		9c-distinguish between variables and parameters in a graph 9e-construct appropriate graphs from data and develop quantitative statements		students will be able to construct and interpret a graph	lab write-up; homework; benchmark, unit notebook	2a.2b.2d.2e .3a.4b.5d
The SI is the universally accepted system of measurement		9d. Recognize the slope of a graph as a constant in $y=kx$ and interpret data using this constant. 9e. Draw appropriate graphs using data		students will be able to visually and mathematically solve problems using SI	quiz, benchmark	2d.2e.3a.4b .4c.5b
Graphing can help calculate predicted outcomes		9c-distinguish between variables and parameters in a graph 9g-distinguish between linear and non-linear relationships on a graph		students will be able to interpret data and predict outcomes using a graph	authentic assessment, homework, graphing as a group	2a.2b.2d.2e .3a.4b.5d
Density		8a-students will know that density is mass/volume. 8b. Students know how to calculate the density of substances from measures of mass and volume		student groups will calculate the mass/volume/density of certain items	class labs	3c. 3d. 3e. 5b. 5c. 5d

# HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

# UNIT PLANNER

Teacher's Name:	ESTES	Subject:	SCIENCE 8	Period(s):	1-5
-----------------	-------	----------	-----------	------------	-----

Unit #:	3	Dates - Starting:	WEEK 4	Ending:	WEEK 9	Total Instructional Days:	
---------	---	-------------------	--------	---------	--------	---------------------------	--

Unit Title:	MOTION
-------------	--------

Theme: CDE.1 MOTION: The velocity of an object is the rate of change of its position

Biblical Application: Genesis 1:1-In the beginning, God created the heavens and the earth

Key Concepts	Standards/Sub-Strands	Outcomes	Assessment	ESLRs
1) Describe and measure motion	1a. Students know motion is defined by standard reference points. 1b. Students know that $S=D/T$ and average speed is $TD/TT$ . 1d. Students will understand that velocity is direction and magnitude.	quick starts, oral and written reviews, various handouts	benchmark, homework, class work, reviews, quizzes	2a.3a.3b.3d.3e.4b.5a.6d
2) Determining speed and average speed	1c. Students can solve problems involving $S=D/T$ and average speed. 1d. Students will know that velocity is both speed and direction	quick starts, oral and written reviews, various handouts	benchmark, homework, class work, reviews, quizzes	2e.3a.3b.3d.3e.4b.4c.5a.5d
3) Acceleration	1e. Student will know that a change in velocity may be due to a change in speed or direction or both	quick starts, oral and written reviews, various handouts	benchmark, homework, class work, reviews, quizzes	2e.3a.3b.3d.4b.4c.4d.5a.6d.
4) Graphing	1f. Students will know how to design and interpret motion and acceleration graphs.	Quick starts, oral and written reports, boardwork, homework.	Graded chapter project; graded unit notebooks	2e.3a.3b.3d.3e.4b.4c.5a.6d
5)		Marbles to illustrate force, acceleration, potential and kinetic energy		

Key Activities and Methods

# HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

# UNIT PLANNER

Teacher's Name: ESTES		Subject: SCIENCE 8		Period(s): 1-5	
Unit #: 4	Dates - Starting: WEEK #10	Ending: WEEK #18	Total Instructional Days:		
Unit Title: FORCES, DENSITY AND BUOYANCY; SLOW MOTION ON PLANET EARTH.					
Theme: CDE. 2 FORCES: Unbalanced forces cause change. CDE8. DENSITY/BOUYANCY:all immersed objects experience buoyant forces.					
Biblical Application: He has put the sun in its courses					
Key Concepts	Standards/Sub-Strands	Outcomes	Assessment	ESLRs	
1) Nature of Force	2a. Students know that a force will have direction and magnitude. 2d. Students will recognize that when there is two or more forces on an object, the result is the cumulative effect of all.	quick starts, homework, handouts, written and oral reviews	benchmark, chapter project, homework, quizzes	2e.3a.3b.3d.4b.4c .4d.5a.6d.	
2) Friction and gravity	2c. Students will know that unbalanced forces create movement. 2d. Students will recognize that different forces such as gravity, wind, etc, act upon static objects	quick starts, homework, handouts, written and oral reviews	benchmark, graded chapter project, quizzes	2e.3a.3b.3d.4b.4c .4d.5a.6d.	
3) Newton's Laws	2e. Students will understand the relationship between force, motion, and Newton's laws	quick starts, homework, handouts, written and oral reviews	benchmark, graded chapter project, quizzes	2e.3a.3b.3d.3e.4b .4c.5a.6d	
4) Density and buoyancy	8a. Students know that $D=M/V$ . Students can use this to calculate density, mass, and/or volume	quick starts, homework, handouts, written and oral reviews	benchmark, graded chapter project, quizzes	2e.3a. 3b.3d. 3e.4b.4c.5a.6d.	
5) Slow motion on planet earth.	Students will understand that tectonic plates are the foundation of all surface features of the earth.	maps, homework, written and oral reviews	benchmark, graded chapter project, quizzes	5d.6a	
Use of marbles for various activities illustrating motion, conservation of momentum forces, etc.					

# HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

# UNIT PLANNER

Teacher's Name:	Luther Estes	Subject:	Science 8	Period(s):	1-5
-----------------	--------------	----------	--------------	------------	-----

Unit #:	5	Dates - Starting:	7-Jan	Ending:	7-Mar	Total Instructional Days:	
---------	---	-------------------	-------	---------	-------	---------------------------	--

Unit Title: Chemistry: The Study of Matter

Theme: CDE 7. PERIODIC TABLE: The organization of the periodic table is based on the properties of the elements and reflects their atomic structure.

Biblical Application: Genesis 1:31-"And God saw all that He had made and said it was very good"

Key Concepts	Standards/Sub-Strands	Outcomes	Assessment	ESLRs
1) Organizing the elements.	7b. Students know that each element has a set molecular structure that identifies it.	quizzes, homework, written and oral reviews, handouts	benchmark, quizzes, chapter project	4b.3e.3a.4b.4c.5a .6d.
2) Introduction to atoms	7a. Students understand that basic atomic structure consists of a nucleus and shell	quizzes, homework, written and oral reviews, handouts	benchmark, quizzes, chapter project	4b.3e.3a.4b.4c.5a .6d.
		Using clues and logic, the students will produce an atomic chart using different terms	Alien Periodic Chart	2a. 3c. 5c.
			Play-Doh-nuclei and atomic structure	5c. 5e.
5)				

Use of play doh to show comprehension of construction of nucleus and construction of the sub atomic particles in various elements.

# HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

# UNIT PLANNER

Teacher's Name: ESTES		Subject: SCIENCE 8		Period(s): 1-5	
Unit #: 6	Dates - Starting: WEEK#19	Ending: WEEK # 26	Total Instructional Days:		
Unit Title: THE STRUCTURE OF MATTER					
Theme: CDE 3 THE STRUCTURE OF MATTER: Each of the more than 100 elements of matter has a distinct atomic structure and properties.					
Biblical Application: 2 Peter 3:10-12-"And the day of the Lord shall come like a thief in the night..and the elements will melt with fervent heat."					
Key Concepts	Standards/Sub-Strands	Outcomes	Assessment	ESLRs	
1) Describing matter	3a. Students will know the structure of the atom and that is composed of protons, neutrons, and electrons. 3b. Students will know that compounds link two or more elements.	quick starts, quizzes, homework, handouts, chapter project, unit notebook	benchmark, quizzes, chapter project	3a.3d.4i. 5a.5b.5d.	
2) States of matter	3e. Students know that states of matter are determined by position and movement of molecules.	quick starts, quizzes, homework, handouts, chapter project, unit notebook	benchmark, quizzes, chapter project	3a.3d.4i. 5a.5b.5d.	
3) Changes of state	3f. Students will know how to use the periodic table to identify elements in simple compounds	quick starts, quizzes, homework, handouts, chapter project, unit notebook	benchmark, quizzes, chapter project	3a.3d.4i. 5a.5b.5d.	
4)			Using Play-Doh, to make and illustrate atomic structure		
5)					
Key Activities and Methods					

# HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

# UNIT PLANNER

Teacher's Name: ESTES		Subj: SCIENCE 8		Period(s): 1-5	
Unit #: 7	Dates - Starting: WEEK #26	Ending: WEEK #35	Total Instructional Days:		
Unit Title: REACTIONS					
Theme: CDE 5. REACTIONS: Chemical compounds are processes by which molecular structures share and combine to form compounds.					
Biblical Application: 2 Peter 3:10-"But the day of the Lord will come..and the elements will be destroyed with a fierce heat"					
Key Concepts	Standards/Sub-Strands	Outcomes	Assessment	ESLRs	
1) Changes in matter	5d. Students know physical processes include freezing and boiling, in which a material changes form with no chemical reaction.	quizzes, handouts, homework	benchmark, quizzes, chapter project, unit notebook	5a. 5b.5d.5e.6d.	
2) Bonding	5a. Students will know how an atom's structure determines in ability to change forms	quizzes, handouts, homework	benchmark, quizzes, chapter project, unit notebook	5a. 5b.5d.5e.6d.	
3) Radiation	5c. Students know chemical reactions usually liberate or absorb heat.	handouts, quiz, homework	benchmark, quizzes, homework	3b. 3c. 5a. 5b. 5d.	
4)					
5)					
Key Activities and Methods					

# HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

# UNIT PLANNER

Teacher's Name:	ESTES	Subject:	SCIENCE 8	Period(s):	1-5
-----------------	-------	----------	-----------	------------	-----

Unit #:	8	Dates - Starting:	30-Apr	Ending:	17-May	Total Instructional Days:	10
---------	---	-------------------	--------	---------	--------	---------------------------	----

Unit Title:	DYNAMICS OF FLIGHT
-------------	--------------------

Theme:	THE FORCES THAT ALLOW FLIGHT TO OCCUR
--------	---------------------------------------

Biblical Application:	Ps. 139:9-"if I take wings of the morning and dwell in the uttermost parts of the sea even there your hand shall lead me"
-----------------------	---

Key Concepts	Standards/Sub-Strands	Outcomes	Assessment	ESLRs
1) There are four forces that act airplanes	8b-When an object is subject to 2 or more forces at once, the effect is the cumulative effect of all forces	review sheets, quick starts, quizzes	benchmark, paper plane contest using knowledge of forces	2e. 3c. 3d. 5b.5c.6c
2) Thrust must be greater than drag and lift greater than gravity for a plane to fly	2c. When forces on an object are balanced, there is no movement.	review sheets, quick starts, quizzes	benchmark, paper plane contest using knowledge of forces	2e. 3c. 3d. 5b.5c.6c
3) The Bernoulli Principle explains flight	2e. When forces are unbalanced, movement occurs and the object will change its motion.	review sheets, quick starts, quizzes	benchmark, paper plane contest using knowledge of forces	2e. 3c. 3d. 5b.5c.6c
4)				
5)				

Key Activities and Methods
----------------------------

# HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

# UNIT PLANNER

Teacher's Name: ESTES		Subject: SCIENCE 8		Period(s): 1-5	
Unit #: 9	Dates - Starting: 20-May	Ending: 1-Jun	Total Instructional Days: 12		
Unit Title: WAVES					
Theme: WAVES HAVE BOTH COMMON CHARACTERISTICS AND UNIQUE CHARACTERISTICS PER TYPE OF WAVE					
Biblical Application: GEN. 1:2-"And the earth was without form or void and darkness covered the face..and God moved on the waters...."					
Key Concepts	Standards/Sub-Strands	Outcomes	Assessment	ESLRs	
1) Wavelength, frequency and speed of waves are mathematically discernable	1b. Average speed is total distance/total time	HW, review sheets, review games	benchmark, quizzes, quick starts	3a. 5c. 5d 6e.	
2) Waves have common and unique features	2a. Force has direction and velocity. 2b When an object is subject to 2 or more forces, the effect is the cumulative effect of all forces	HW, review sheets, review games	benchmark, quizzes, quick starts	3a. 5c. 5d 6e.	
3)					
4)					
5)					
Key Activities and Methods					

## PACING GUIDE

**Subject:** SCIENCE 8 **Grade:** 8

**Total number of standards:** 9

Quarter	Units Taught	Standards Taught	Standards Assessed & week	Authentic Assessment
1	Cp 1-Investigation and Experimentation=#9 (BM) Cp.2-Matter-#3,5 Cp.3-States of Matter-#3,5 Cp.4-Elements and Periodic Table #-#3,#7 (BM #3)	Standard #9-Investigation and Experimentation Standard #3-Structure of Matter Standard #5-Reactions Standard #7-Periodic Table	#9-Investigation and Experimentation-Week #4 #3-Structure of Matter-Week #8	Measuring and Graphing Motion – Week #8
2	Cp. 5-States of Matter-Standard #7 (BM #7) Cp. 6-Chemical Reactions-#5 (BM #5) Cp. 7-Acids, Bases, Salts-#5 Cp. 8-Carbon-#6 (BM #6)	#5-Reactions #6-Chemistry of Living Systems #7-Periodic Table	#5-Reactions-Week #15 #6- Chemistry of Living Systems-Week #18 #7-Periodic Table-Week #11	
3	Cp. 9-Motion-Standard #1 (BM #1) Cp 10 -Forces-Standard #2 (BM #2)	#1-Motion #2-Forces	#1-Motion-Week # 23 #2-Forces-Week #27 (D.C. trip will influence the timing here)	
4	Cp. #11-Forces in Fluids-Standard #8 (BM #8) Cp. 13-Man in Space-Standard #4 Cp. 15-Stars and Galaxies-Standard #4 (BM #4)	#8-Density and Buoyancy #4-Earth in the Solar System	#8-Density and Buoyancy-Week #31 #4-Earth in the Solar System-Week #34	
<b>Omitted Standards and why</b>			I have given 3 weeks spare into the schedule to change and adapt as may be needed	

# HEIGHTS CHRISTIAN JUNIOR HIGH SCHOOL

## Mission Statement

"Our mission is to educate students to know Christ personally, excel academically, think biblically, and positively impact their community for Christ."

## Expected Schoolwide Learning Results (ESLRs)

### 1. Biblical World View

*Graduates of HCJH are expected to be individuals who . . .*

- a) know how to study the Bible.
- b) recognize that all people are created in the image of the one true God.
- c) acknowledge the Bible as the infallible Word of God.
- d) use God's Word to discern truth.

### 2. Effective Communicators

*Graduates of HCJH are expected to be effective communicators who . . .*

- a) listen objectively and critically.
- b) understand and follow directions.
- c) write and speak clearly and accurately.
- d) express and support opinions using objective evidence.
- e) utilize various modalities effectively.
- f) can demonstrate a personal relationship with Jesus Christ verbally and in writing.

### 3. Proficient Learners

*Graduates of HCJH are expected to be proficient learners who . . .*

- a) demonstrate grade appropriate skills in reading, writing, and mathematics.
- b) have effective work habits and study skills.
- c) are self-directed and able to produce cooperatively and independently.
- d) can utilize technology.
- e) have a firm grasp of scripture and are able to apply it to life situations.

### 4. Personal Responsibility

*Graduates of HCJH are expected to be responsible individuals who . . .*

- a) show patriotism through respect for flag, country, leaders and laws.
- b) demonstrate self-control based on biblical standards.
- c) exhibit respect for others.
- d) accept the consequences and benefits of their actions.
- e) are aware of career opportunities.
- f) practice goal setting with a biblical perspective.
- g) are involved in serving the community.
- h) have a personal relationship with Jesus Christ.
- i) have the tools to share their faith.
- j) demonstrate an urgency to share their faith.

### 5. Problem Solvers

*Graduates of HCJH are expected to be perceptive thinkers and problem solvers who . . .*

- a) evaluate current topics using a biblical perspective.
- b) use available technology to obtain, access and integrate relevant information.
- c) think analytically and creatively.
- d) are well-informed and open-minded.
- e) apply academic learning to life.

### 6. Well-Rounded

*Graduates of HCJH are expected to be well-rounded individuals who . . .*

- a) have been exposed to a variety of elective opportunities and experiences.
- b) are challenged beyond academics through a variety of extracurricular activities.
- c) lead lives that are balanced intellectually, spiritually, physically and emotionally.
- d) develop an appreciation for teamwork during school activities.
- e) understand God's involvement in every area of their lives.

**Grade Eight****Focus on Physical Sciences.****Motion**

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

- Students know* position is defined in relation to some choice of a standard reference point and a set of reference directions.
- 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.
- Students know* how to solve problems involving distance, time, and average speed.
- Students know* the velocity of an object must be described by specifying both the direction and the speed of the object.
- Students know* changes in velocity may be due to changes in speed, direction, or both.
- 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:

- Students know* a force has both direction and magnitude.
- Students know* when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces.
- Students know* when the forces on an object are balanced, the motion of the object does not change.
- 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.
- 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).
- Students know* the greater the mass of an object, the more force is needed to achieve the same rate of change in motion.
- 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:

- Students know* the structure of the atom and know it is composed of protons, neutrons, and electrons.
- 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.
- Students know* atoms and molecules form solids by building up repeating patterns, such as the crystal structure of NaCl or long-chain polymers.
- Students know* the states of matter (solid, liquid, gas) depend on molecular motion.
- 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.
- Students know* how to use the periodic table to identify elements in simple compounds.

**Advanced 2****Physical Sciences**

- Classify substances in groups by common characteristics
- Identify basic parts of chemical reactions
- Recognize common compounds
- Analyze graphs of motion of objects
- Analyze patterns of change in substances
- Apply an understanding of heat flow
- Compare characteristics of light and sound
- Identify basic functions of substances
- Identify the basic function of a given electrical circuit
- Identify the cause in the change of the behavior of light
- Make a prediction about motion of simple machines

**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:

- Students know* galaxies are clusters of billions of stars and may have different shapes.
- 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.
- Students know* how to use astronomical units and light years as measures of distances between the Sun, stars, and Earth.
- 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.
- 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:

- Students know* reactant atoms and molecules interact to form products with different chemical properties.
- 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.
- Students know* chemical reactions usually liberate heat or absorb heat.
- Students know* physical processes include freezing and boiling, in which a material changes form with no chemical reaction.
- 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:

- 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.
- Students know* that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur.
- 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:

- Students know* how to identify regions corresponding to metals, nonmetals, and inert gases.
- 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.
- 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:

- Students know* density is mass per unit volume.

**Earth Sciences**

- Identify parts of weather systems
- Interpret models of Earth motions
- Interpret models showing the relationship between sun and Earth
- Analyze graphic information about weather patterns
- Draw a conclusion using given data about soil formation
- Identify fossil evidence
- Make a prediction about changes shown in celestial objects
- Compare the characteristics of Earth to other celestial objects
- Identify the relationship between the angle of sunlight and temperature
- Predict the effects of Earth changes on rock structure

- 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:

- Plan and conduct a scientific investigation to test a hypothesis.
- Evaluate the accuracy and reproducibility of data.
- Distinguish between variable and controlled parameters in a test.
- 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.
- Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.
- 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).
- Distinguish between linear and nonlinear relationships on a graph of data.

#### **Nature of Science**

- Analyze patterns of data to identify a problem
- Evaluate experimental setups
- Identify constants in an experiment
- Draw a conclusion using given data
- Recognize logical hypotheses
- Identify basic properties of matter mathematically
- Make a prediction about motion of gear systems

#### **Life Sciences**

- Make an inference by comparing characteristics of organisms
  - Translate information from food webs into different models
  - Use models and keys to scientifically identify organisms
  - Use models to identify cell types
  - Compare changes in plant parts using given information
  - Determine the relevance of changes in mammal body functions
  - Sequence events in cellular events
  - Evaluate data taken from different biomes
  - Evaluate given adaptations for their functions in organisms
  - Identify commonalities among groups of organisms
- Make a prediction about a population III a given ecosystem