Science 7 Honors

Curriculum Guide

Dunmore School District

Dunmore, PA



Science 7 Honors

Prerequisite:

• Successful completion Sixth Grade Science

The Science 7 Honors (Earth and Space Science) course is designed to introduce the Earth sciences to the self-motivated student who is college bound. The Earth science course is designed to interpret and understand the world around you. In order to do so, students will investigate and study the interactions between the four major Earth's spheres including the geosphere, atmosphere, hydrosphere and biosphere in order to explain Earth's formation, processes, history, landscapes, how and why Earth changes over time. The course will also explore how current actions of man interact and affect Earth's spheres leading to local and global changes. Topics to be addressed include, but are not limited to, fossil fuels, alternative energy, renewable resources, nonrenewable resources, minerals, rocks, plate tectonics, earthquakes, volcanoes, geologic time, meteorology, energy transfer, densities of fluids, water in the air, water cycle, the Sun, the Moon, solar system, galaxy, and universe.

Year-at-a-glance

Subject: Science 7 Honors	Grade Level: 7	Date Completed: 3/14/18

1st Quarter

Торіс	Resources	Standards
Earth as a System	Teacher made documents	3.5.7.A, 3.5.7.C, 3.5.7.D,
	Teacher prepared labs	3.1.7.A, 3.1.7.B, 3.1.7.E,
	Lab on carbon sequestration	3.2.7.A, 3.2.7.B, 3.2.7.C,
	Show movie Tapped with worksheet	3.2.7.D, 3.1.7.D
Resources and the Environment	Teacher made documents	3.1.7.A, 3.1.7.D, 3.1.7.E,
	Teacher prepared labs	3.2.7.A, 3.2.7.B, 3.2.7.C,
	Lab on alternative energies	3.2.7.D, 3.5.7.A, 3.5.7.B
Earth History	Teacher made documents	3.5.7.B, 3.1.7.A, 3.1.7.D,
	Teacher prepared labs	3.1.7.E, 3.2.7.A, 3.2.7.B,
	Lab on Minerals	3.2.7.C, 3.2.7.D, 3.5.7.A,
	Acid testing for calcite Lab	3.4.7.B, 3.4.7.D
	Lab Identify the missing rock layer	
	Video PBS NOVA Origins of North America with	
	worksheet	
	Lab Grand Canyon Stream Table	
	Video on Weathering and Erosion with worksheet	
	Seawater/Limestone lab	
	Adding tape timelines for the Earth	
	PBS timelines website	
	Lab on Salol Crystals and crystal size	
	Lab Convection in fluids	
	Lab on Plate Tectonics	

2nd Quarter

Торіс	Resources	Standards
Earth History Continued	See Quarter 1	3.5.7.B, 3.1.7.A, 3.1.7.D,
		3.1.7.E, 3.2.7.A, 3.2.7.B,
		3.2.7.C, 3.2.7.D, 3.5.7.A,
		3.4.7.B, 3.4.7.D

3rd Quarter

Торіс	Resources Standards		
Weather and Water	Teacher made documents	3.1.7.A, 3.1.7.B, 3.1.7.C,	
	Teacher prepared labs	3.1.7.D, 3.1.7.E, 3.2.7.A,	
	Lab Gas in a syringe	3.2.7.B, 3.2.7.C, 3.2.7.D,	
	Lab balloon balance	3.4.4.D, 3.4.7.D, 3.5.7.C,	
	Lab Air Pressure: pressure in a jar	3.5.7.D	
	Video Natgeo Bill Nye Global Meltdown with		
	worksheet		
	Lab on Radiation and Energy Transfer		
	Sun and Seasons animated graphic		
	Direct Solar Energy demonstration		
	Lab Conduction Aluminum and Steel in hot water		
	Lab Density layering salt solutions		
	Lab Density of hot and cold water		
	Lab Convection Chamber gas		
	Lab on relative humidity		
	Lab on condensation and dew point		
	Lab making a Cloud in a bottle		
	Lab on Oceans		

4th Quarter

Торіс	Resources	Standards
Weather and Water Continued	See Quarter 3	3.1.7.A, 3.1.7.B, 3.1.7.C,
		3.1.7.D, 3.1.7.E, 3.2.7.A,
		3.2.7.B, 3.2.7.C, 3.2.7.D,
		3.4.4.D, 3.4.7.D, 3.5.7.C,
		3.5.7.D
Origins the Sun, the Solar System, and our Moon	Teacher made documents	3.1.7.A, 3.1.7.B, 3.1.7.C,
	Teacher prepared labs	3.1.7.D, 3.2.7.A, 3.2.7.B,
	Lab on Relativity and Gravity	3.2.7.C, 3.2.7.D, 3.4.4.D,
	Lab on stars and outer solar system	3.4.7.D
	Video on the Sun with worksheet	
	Activities and demonstrations with telescope	
	Activity with the phases of the Moon	
	Video on the Moon with worksheet	
The Planets, Solar System, and Life Cycle of Stars	Teacher made documents	3.1.7.A, 3.1.7.B, 3.1.7.C,
	Teacher prepared labs	3.1.7.D, 3.2.7.A, 3.2.7.B,
	Lab on spectroscopy	3.2.7.C, 3.2.7.D, 3.4.4.D,
	Lab on Planets	3.4.7.D
Review and Final Exam		

General Topic	Anchor Descriptor	Eligible Content,	Resources &	Assessments	Suggested
	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary	Activities		lime (In Days)
Earth as a System	Anchor Descriptor:	Eligible Content:	Teacher made	Teacher prepared	15 Days
	S8.A.1.1 Explain, interpret, and	S8.A.1.1.1 Distinguish	documents	tests, quizzes, etc.	
What is Earth	apply scientific, environmental,	between a scientific theory			
system science?	or technological knowledge	and an opinion, explaining	Teacher prepared	Series available	
	presented in a variety of formats	how a theory is supported	labs	assessments online.	
What are the	(e.g., visuals, scenarios, graphs).	with evidence, or how new		(Optional)	
Earth system's		data/information may	Atlantic Magazine		
four spheres, and	S8.A.1.2 Identify and explain the	change existing theories and	Article 50 Greatest		
how do they	impacts of applying scientific,	practices.	Inventions		
affect one	environmental, or technological		Calculators		
another?	knowledge to address solutions	S8.A.1.1.2 Explain how	Chromebooks		
	to practical problems.	certain questions can be	DVD "Tapped"		
What are cycles		answered through scientific	Follow direction Quiz		
and how do they	S8.A.1.3 Identify and analyze	inquiry and/or technological	Google Classroom		
work?	evidence that certain variables	design.	Google Drive		
	may have caused measurable		Google Form		
The Earth is a	changes in natural or human-	S8.A.1.1.3 Use evidence, such	Google Sheets		
complex and	made systems.	as observations or	Lab on carbon		
dynamic set of		experimental results, to	sequestration		
interconnected	S8.A.2.1 Apply knowledge of	support inferences about a	Newsela website		
systems (e.g.	scientific investigation or	relationship.	Prezi online		
geosphere,	technological design in different		slideshow		
hydrosphere,	contexts to make inferences to	S8.A.1.1.4 Develop	Print out of notes for		
atmosphere,	solve problems.	descriptions, explanations,	students		
biosphere) that		predictions, and models	Promethean Board		
interact over a	S8.A.2.2 Apply appropriate	using evidence.	Summative		
wide range of	instruments for a specific		Assessment		
temporal and	purpose and describe the	S8.A.1.2.1 Describe the	Video Worksheet		
spatial scales.	information the instrument can	positive and negative,	Vocabulary		

The Earth's	provide.	intended and unintended,	Worksheet on carbon	
processes affect		effects of specific scientific	sequestration	
and are affected	S8.A.3.1 Explain the parts of a	results or technological	YouTube class review	
by human	simple system, their roles, and	developments (e.g., air/space	videos	
activities.	their relationships to the system	travel, genetic engineering,		
	as a whole.	nuclear fission/fusion,		
		artificial intelligence, lasers,		
	S8.A.3.2 Apply knowledge of	organ transplants).		
	models to make predictions,			
	draw inferences, or explain	S8.A.1.2.2 Identify		
	technological concepts.	environmental issues and		
		explain their potential long-		
	S8.A.3.3 Describe repeated	term health effects (e.g.,		
	processes or recurring elements	pollution, pest controls,		
	in natural, scientific, and	vaccinations).		
	technological patterns.			
		S8.A.1.2.3 Describe		
	S8.B.3.3 Explain how renewable	fundamental scientific or		
	and nonrenewable resources	technological concepts that		
	provide for human needs or	could solve practical		
	how these needs impact the	problems (e.g., Newton's		
	environment.	laws of motion, Mendelian		
		genetics).		
	S8.D.1.3 Describe characteristic			
	features of Earth's water	S8.A.1.2.4 Explain society's		
	systems or their impact on	standard of living in terms of		
	resources.	technological advancements		
	DA Assidencia Chandendar	and now these		
	PA Academic Standards:	advancements impact on		
	2 1 7 A Evaluin the parts of a	agriculture (e.g.,		
	simple system and their	production storage)		
	simple system and their	production, storage).		
	Describe a system as a group	S8 A 1 2 1 Uso ratio to		
	• Describe a system as a group	Jo.A.1.3.1 USE ratio to		
	of related parts that work	describe change (e.g.,		

together to achieve a desired	percents, parts per million,		
result (e.g., digestive system).	grams per cubic centimeter,		
 Explain the importance of 	mechanical advantage).		
order in a system.			
 Distinguish between system 	S8.A.1.3.2 Use evidence,		
inputs, system processes and	observations, or explanations		
system outputs.	to make inferences about		
 Distinguish between open 	change in systems over time		
loop and closed loop systems.	(e.g., carrying capacity,		
 Apply systems analysis to 	succession, population		
solve problems.	dynamics, loss of mass in		
	chemical reactions, indicator		
3.1.7.B Describe the use of	fossils in geologic time scale)		
models as an application of	and the variables affecting		
scientific or technological	these changes.		
concepts.			
 Identify and describe different 	S8.A.1.3.3 Examine systems		
types of models and their	changing over time,		
functions.	identifying the possible		
 Apply models to predict 	variables causing this change,		
specific results and observations	and drawing inferences		
(e.g., population growth, effects	about how these variables		
of infectious organisms).	affect this change.		
 Explain systems by outlining a 			
system's relevant parts and its	S8.A.1.3.4 Given a scenario,		
purpose and/or designing a	explain how a dynamically		
model that illustrates its	changing environment		
function.	provides for the sustainability		
	of living systems.		
3.1.7.D Explain scale as a way of			
relating concepts and ideas to	S8.A.2.1.1 Use evidence,		
one another by some measure.	observations, or a variety of		
 Apply various applications of 	scales (e.g., mass, distance,		
size and dimensions of scale to	volume, temperature) to		
scientific, mathematical, and	describe relationships.		

technological applications.S8.A.2.1.4 Interpret• Describe scale as a form of ratio and apply to a life situation.S8.A.2.1.4 Interpret drata/observations; develop relationships among variables based on data/observations to design models as solutions.3.1.7.E Identify change as a variable in describing natural and physical systems.s8.A.2.1.Describe the appropriate use of accurately and safely• Describe fundamental science and technology concepts that could solve practical problems. • Explain how ratio is used to describe change.s8.A.2.2.1 Describe the appropriate use of accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.3.2.7.A Explain and apply scientific and technological knowledge.s8.A.2.2.2 Apply appropriate temperature) to record and interpret observations under varying conditions.• Distinguish between a scientific theory and a belief. • Answer "What If" questions based on observation, inference or prior knowledge or experiance.s8.A.2.2.3 Describe ways technology (e.g., microscope, technology (e.g., microscope, texplain how skepticism about an accepted scientific may change existing theoris and practice.s8.A.3.1.1 Describe a system (e.g., watershed, circulatory system, heating system, a acicultural system) as a• Distinguish between a districe.s8.A.3.1.1 Describe a system (e.g., watershed, circulatory system, heating system, a gricultural system) as a <th></th> <th></th> <th></th> <th></th>				
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scientific theory and a belief.varying conditions.• Answer "What if" questionsS8.A.2.2.3 Describe waysbased on observation, inferenceS8.A.2.2.3 Describe waysor prior knowledge ortechnology (e.g., microscope,experience.telescope, micrometer,• Explain how skepticism abouthydraulics, barometer)an accepted scientificextends and enhancesexplanation led to a newhuman abilities for specificunderstanding.purposes.• Explain how new informationS8.A.3.1.1 Describe a systemmay change existing theoriesS8.A.3.1.1 Describe a system,and practice.(e.g., watershed, circulatory system, heating system,3.2.7.B Apply processagricultural system) as a	 Distinguish between a 	interpret observations under		
 Answer "What if" questions based on observation, inference or prior knowledge or technology (e.g., microscope, technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) an accepted scientific extends and enhances explanation led to a new human abilities for specific purposes. Explain how new information may change existing theories and practice. (e.g., watershed, circulatory system, heating system, 3.2.7.B Apply process 	scientific theory and a belief.	varying conditions.		
based on observation, inferenceS8.A.2.2.3 Describe waysor prior knowledge ortechnology (e.g., microscope,experience.telescope, micrometer,• Explain how skepticism abouthydraulics, barometer)an accepted scientificextends and enhancesexplanation led to a newhuman abilities for specificunderstanding.purposes.• Explain how new informationS8.A.3.1.1 Describe a systemmay change existing theoriesS8.A.3.1.1 Describe a systemand practice.(e.g., watershed, circulatory system, heating system,3.2.7.B Apply processagricultural system) as a	 Answer "What if" questions 			
or prior knowledge ortechnology (e.g., microscope, telescope, micrometer,experience.telescope, micrometer,• Explain how skepticism about an accepted scientifichydraulics, barometer)an accepted scientificextends and enhancesexplanation led to a new understanding.human abilities for specific purposes.• Explain how new information may change existing theories and practice.S8.A.3.1.1 Describe a system (e.g., watershed, circulatory system, heating system, a gricultural system) as a	based on observation, inference	S8.A.2.2.3 Describe ways		
experience.telescope, micrometer, hydraulics, barometer)• Explain how skepticism about an accepted scientifichydraulics, barometer)extends and enhancesextends and enhancesexplanation led to a new understanding.human abilities for specific purposes.• Explain how new information may change existing theories and practice.S8.A.3.1.1 Describe a system (e.g., watershed, circulatory system, heating system, a gricultural system) as a3.2.7.B Apply processagricultural system) as a	or prior knowledge or	technology (e.g., microscope,		
 Explain how skepticism about an accepted scientific extends and enhances explanation led to a new human abilities for specific purposes. Explain how new information may change existing theories and practice. 3.2.7.B Apply process hydraulics, barometer) extends and enhances human abilities for specific purposes. S8.A.3.1.1 Describe a system and practice. gystem, heating system, agricultural system) as a 	experience.	telescope, micrometer,		
an accepted scientificextends and enhancesexplanation led to a newhuman abilities for specificunderstanding.purposes.• Explain how new informations8.A.3.1.1 Describe a systemmay change existing theoriesS8.A.3.1.1 Describe a systemand practice.(e.g., watershed, circulatorysystem, heating system,system, heating system,3.2.7.B Apply processagricultural system) as a	 Explain how skepticism about 	hydraulics, barometer)		
explanation led to a new understanding.human abilities for specific purposes.• Explain how new information may change existing theories 	an accepted scientific	extends and enhances		
understanding.purposes.• Explain how new information may change existing theories and practice.S8.A.3.1.1 Describe a system (e.g., watershed, circulatory system, heating system, a gricultural system) as aImage: Comparison of the comparis	explanation led to a new	human abilities for specific		
 Explain how new information may change existing theories and practice. 3.2.7.B Apply process S8.A.3.1.1 Describe a system (e.g., watershed, circulatory system, heating system, agricultural system) as a 	understanding.	purposes.		
may change existing theories and practice.S8.A.3.1.1 Describe a system (e.g., watershed, circulatory system, heating system,3.2.7.B Apply processagricultural system) as a	 Explain how new information 			
and practice.(e.g., watershed, circulatory system, heating system, agricultural system) as a3.2.7.B Apply processagricultural system) as a	may change existing theories	S8.A.3.1.1 Describe a system		
system, heating system,3.2.7.B Apply processagricultural system) as a	and practice.	(e.g., watershed, circulatory		
3.2.7.B Apply process agricultural system) as a		system, heating system,		
	3.2.7.B Apply process	agricultural system) as a		

knowledge to make and	group of related parts with		
interpret observations.	specific roles that work		
 Measure materials using a 	together to achieve an		
variety of scales.	observed result.		
 Describe relationships by 			
making inferences and	S8.A.3.1.2 Explain the		
predictions.	concept of order in a system		
 Communicate, use space / 	[e.g., (first to last:		
time relationships, define	manufacturing steps, trophic		
operationally, raise questions,	levels); (simple to complex:		
formulate hypotheses, test and	cell, tissue, organ, organ		
experiment,	system)].		
 Design controlled 			
experiments, recognize	S8.A.3.1.3 Distinguish among		
variables, and manipulate	system inputs, system		
variables.	processes, system outputs,		
 Interpret data, formulate 	and feedback (e.g., physical,		
models, design models, and	ecological, biological,		
produce solutions.	informational).		
3.2.7.C Identify and use the	S8.A.3.1.4 Distinguish		
elements of scientific inquiry to	between open loop (e.g.,		
solve problems.	energy flow, food web) and		
 Generate questions about 	closed loop (e.g., materials in		
objects, organisms and/or	the nitrogen and carbon		
events that can be answered	cycles, closed-switch)		
through scientific investigations.	systems.		
 Evaluate the appropriateness 			
of questions.	S8.A.3.1.5 Explain how		
 Design an investigation with 	components of natural and		
limited variables to investigate a	human-made systems play		
question.	different roles in a working		
 Conduct a two-part 	system.		
experiment. • Judge the			
significance of experimental	S8.A.3.2.1 Describe how		

information in answering the	scientists use models to		
question.	explore relationships in		
 Communicate appropriate 	natural systems (e.g., an		
conclusions from the	ecosystem, river system, the		
experiment.	solar system).		
3.2.7.D Know and use the	S8.A.3.2.2 Describe how		
technological design process to	engineers use models to		
solve problems.	develop new and improved		
 Define different types of 	technologies to solve		
problems.	problems.		
 Define all aspects of the 			
problem, necessary information	S8.A.3.2.3 Given a model		
and questions that must be	showing simple cause and-		
answered.	effect relationships in a		
 Propose the best solution. 	natural system, predict		
 Design and propose 	results that can be used to		
alternative methods to achieve	test the assumptions in the		
solutions.	model (e.g., photosynthesis,		
 Apply a solution. 	water cycle, diffusion,		
 Explain the results, present 	infiltration).		
improvements, identify and			
infer the impacts of the solution.	S8.B.3.1.1 Explain the flow of		
	energy through an ecosystem		
3.5.7.A Describe earth features	(e.g., food chains, food		
and processes.	webs).		
 Describe major layers of the 			
earth.	S8.B.3.1.2 Identify major		
 Describe the processes 	biomes and describe abiotic		
involved in the creation of	and biotic components (e.g.,		
geologic features (e.g., folding,	abiotic: different soil types,		
faulting, volcanism,	air, water sunlight; biotic: soil		
sedimentation) and that these	microbes, decomposers).		
processes seen today (e.g.,			
erosion, weathering crustal	S8.B.3.3.1 Explain how		

plate movement) are similar to	human activities may affect		
those in the past.	local, regional, and global		
 Describe the processes that 	environments.		
formed Pennsylvania geologic			
structures and resources	S8.B.3.3.2 Explain how		
including mountains, glacial	renewable and		
formations, water gaps and	nonrenewable resources		
ridges.	provide for human needs		
 Explain how the rock cycle 	(i.e., energy, food, water,		
affected rock formations in the	clothing, and shelter).		
state of Pennsylvania.			
 Distinguish between examples 	S8.B.3.3.3 Describe how		
of rapid surface changes (e.g.,	waste management affects		
landslides, earthquakes) and	the environment (e.g.,		
slow surface changes (e.g.,	recycling, composting,		
weathering).	landfills, incineration, sewage		
 Identify living plants and 	treatment).		
animals that are similar to fossil			
forms.	S8.D.1.3.1 Describe the water		
	cycle and the physical		
3.5.7.C Describe basic elements	processes on which it		
of meteorology.	depends (i.e., evaporation,		
 Explain weather forecasts by 	condensation, precipitation,		
interpreting weather data and	transpiration, runoff,		
symbols.	infiltration, energy inputs,		
 Explain the oceans' impact on 	and phase changes).		
local weather and the climate of			
a region.	S8.D.1.3.2 Compare and		
 Identify how cloud types, wind 	contrast characteristics of		
directions and barometric	freshwater and saltwater		
pressure changes are associated	systems on the basis of their		
with weather patterns in	physical characteristics (i.e.,		
different regions of the country.	composition, density, and		
 Explain and illustrate the 	electrical conductivity) and		
processes of cloud formation	their use as natural		

 and precipitation. Describe and illustrate the major layers of the earth's atmosphere. Identify different air masses and global wind patterns and how they relate to the weather patterns in different regions of the U.S. 	resources. S8.D.1.3.3 Distinguish among different water systems (e.g., wetland systems, ocean systems, river systems, watersheds) and describe their relationships to each other as well as to landforms.		
 3.5.7.D Explain the behavior and impact of the earth's water systems. Explain the water cycle using the processes of evaporation and condensation. Describe factors that affect evaporation and condensation. Describe factors that affect evaporation and condensation. Distinguish salt from fresh water (e.g., density, electrical conduction). Compare the effect of water type (e.g., polluted, fresh, salt water) and the life contained in them. Identify ocean and shoreline features, (e.g., bays, inlets, spit, tidal marshes). PA Core Standards: Reading for Science and Technical Subjects, 6-12	Essential Knowledge/Skills: All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. The energy is derived from the sun and the earth's interior. These flows and cycles produce chemical and physical changes in Earth's materials and living organisms. Water continually cycles among geosphere, hydrosphere, biosphere, and atmosphere via transpiration, evaporation, condensation and		
3.5 Reading Informational Text Students read, understand, and respond to informational text-	condensation, and precipitation. Human activities influence		

with emphasis on	Earth's global temperature,		
comprehension, making	and these effects can be		
connections among ideas and	mitigated through applying		
between texts with focus on	knowledge of climate		
textual evidence.	science, engineering, etc.		
PA Core Standards: Writing for	Human activities have		
Science and Technical Subjects,	significantly altered the		
6-12	biosphere and geosphere,		
3.6 Writing	sometimes damaging or		
Students write for different	destroying natural habitats		
purposes and audiences.	and causing the extinction of		
Students write clear and focused	other species.		
text to convey a well-defined	-		
perspective and appropriate	Construct and analyze		
content.	models to describe systems		
	interactions among the		
	geosphere, hydrosphere,		
	atmosphere, and biosphere.		
	Investigate water systems to		
	identify seasonal and annual		
	variations in precipitation		
	and streamflow and the		
	causes of those variations.		
	Assess the physical		
	characteristics of a stream to		
	determine the types of		
	organisms found within the		
	stream environment.		
	Ask questions to clarify		
	evidence of the factors that		
	have caused the rise in global		

	temperatures over the past		
	century.		
	Apply scientific principles to		
	design a method for		
	monitoring and minimizing a		
	human impact on the		
	environment.		
	Vocabulary:		
	Atmosphere		
	Biosphere		
	Geosphere		
	Hydrosphere		
	Flow rate		
	Ocean systems		
	River systems		
	Watershed		
	Wetland		
	Biological diversity		
	Stream		
	Tributary		
	Atmosphere Biosphere		
	Carbon dioxide (CO_2)		
	Climate		
	Clobal warming		

General Topic	Anchor Descriptor	Eligible Content,	Resources & Activities	Assessments	Suggested
	PA Academic and Core Standards	Essential Knowledge, Skills & Vocabulary			Time (In Days)
Resources and	Anchor Descriptor:	Eligible Content:	Teacher made	Teacher prepared	15 Days
the Environment	S8.A.1.1 Explain, interpret, and	S8.A.2.1.6 Identify a design	documents	tests, quizzes, etc.	
	apply scientific, environmental,	flaw in a simple technological			
Nonrenewable	or technological knowledge	system and devise possible	Teacher prepared labs	Series available	
Energy Sources	presented in a variety of formats	working solutions.		assessments	
	(e.g., visuals, scenarios, graphs).		Chromebooks	online. (Optional)	
Renewable		S8.B.3.3.1 Explain how	Google Classroom		
Energy Sources	S8.A.1.2 Identify and explain the	human activities may affect	Google Drive		
	impacts of applying scientific,	local, regional, and global	Google Form		
The Earth's	environmental, or technological	environments.	Google Sheets		
processes affect	knowledge to address solutions		Lab Kit on Renewable		
and are affected	to practical problems.	S8.B.3.3.2 Explain how	Energy Sources		
by human		renewable and	Newsela website		
activities.	S8.A.1.3 Identify and analyze	nonrenewable resources	Prezi online slideshow		
	evidence that certain variables	provide for human needs	Print out of notes for		
The Earth is a	may have caused measurable	(i.e., energy, food, water,	students		
complex and	changes in natural or human-	clothing, and shelter).	Promethean Board		
dynamic set of	made systems.		Summative		
interconnected		S8.C.2.2.1 Describe the Sun	Assessment		
systems (e.g.	S8.A.2.1 Apply knowledge of	as the major source of energy	Vocabulary		
geosphere,	scientific investigation or	that impacts the	Worksheet on		
hydrosphere,	technological design in different	environment.	Renewable Energy		
atmosphere,	contexts to make inferences to		Sources Lab		
biosphere) that	solve problems.	S8.C.2.2.2 Compare the time	Youtube class review		
interact over a		span of renewability for fossil	videos		
wide range of	S8.A.2.2 Apply appropriate	fuels and the time span of			
temporal and	instruments for a specific	renewability for alternative			
spatial scales.	purpose and describe the	TUEIS.			
	information the instrument can				
	provide.	S8.C.2.2.3 Describe the waste			

	(i.e., kind and quantity)		
S8.A.3.1 Explain the parts of a	derived from the use of		
simple system, their roles, and	renewable and		
their relationships to the system	nonrenewable resources and		
as a whole. Explain the parts of	their potential impact on the		
a simple system, their roles, and	environment.		
their relationships to the system			
as a whole.	S8.D.1.2.1 Describe a		
	product's transformation		
S8.A.3.2 Apply knowledge of	process from production to		
models to make predictions,	consumption (e.g.,		
draw inferences, or explain	prospecting, propagating,		
technological concepts.	growing, maintaining,		
	adapting, treating,		
S8.B.3.2 Identify evidence of	converting, distributing,		
change to infer and explain the	disposing) and explain the		
ways different variables may	processes potential impact		
affect change in natural or	on Earth's resources.		
human-made systems.			
	S8.D.1.2.2 Describe potential		
S8.B.3.3 Explain how renewable	impacts of human made		
and nonrenewable resources	processes (e.g.,		
provide for human needs or	manufacturing, agriculture,		
how these needs impact the	transportation, mining) on		
environment.	Earth's resources, both		
	nonliving (i.e., air, water, or		
S8.C.2.2 Compare the	earth materials) and living		
environmental impact of	(i.e., plants and animals).		
different energy sources chosen			
to support human endeavors.	S8.D.1.3.2 Compare and		
	contrast characteristics of		
PA Academic Standards:	treshwater and saltwater		
Science	systems on the basis of their		
	physical characteristics (i.e.,		
3.1.7.A Explain the parts of a	composition, density, and		

simple system and their	electrical conductivity) and		
relationship to each oth	er. their use as natural		
Describe a system as	a group resources.		
of related parts that wo	ork		
together to achieve a de	esired		
result (e.g., digestive sys	stem).	_	
Explain the importance	ce of Essential Knowledge/Skills:		
order in a system.			
Distinguish between s	system Humans depend on Earth's		
inputs, system processe	es and land, ocean, atmosphere,		
system outputs.	and living things for many		
Distinguish between o	open different resources.		
loop and closed loop sys	stems.		
 Apply systems analysis 	is to Minerals, fresh water, and		
solve problems.	living resources are limited,		
	and many are not renewable		
3.1.7.D Explain scale as	a way of or replaceable over human		
relating concepts and id	leas to lifetimes.		
one another by some m	leasure.		
Apply various applicat	tions of Human activities have		
size and dimensions of s	scale to significantly altered the		
scientific, mathematical	l, and biosphere and geosphere,		
technological applicatio	ns. sometimes damaging or		
Describe scale as a for	m of destroying natural habitats		
ratio and apply to a life	and causing the extinction o	F	
situation.	other species.		
3.1.7.E Identify change a	as a Describe a product's		
variable in describing na	atural transformation		
and physical systems.	process from production to		
Describe fundamental	l science consumption.		
and technology concept	ts that		
could solve practical pro	oblems. Use maps and other data to		
Explain how ratio is us	sed to explain how geologic		
describe change.	processes have led to the		

 Describe the effect of making 	uneven distribution of Earth's		
a change in one part of a system	natural resources.		
on the system as a whole.			
	Construct an argument		
3.2.7.A Explain and apply	supported by evidence for		
scientific and technological	how increases in human		
knowledge.	population and per-capita		
 Distinguish between a 	consumption of natural		
scientific theory and a belief.	resources impact Earth's		
 Answer "What if" questions 	systems.		
based on observation, inference			
or prior knowledge or	Apply scientific principles to		
experience.	design a method for		
 Explain how skepticism about 	monitoring and minimizing a		
an accepted scientific	human impact on the		
explanation led to a new	environment		
understanding.			
 Explain how new information 	Vocabulary:		
may change existing theories	Atmosphere		
and practice.	Consumption		
	Geosphere		
3.2.7.B Apply process	Hydrosphere		
knowledge to make and	Natural resources		
interpret observations.	Nonrenewable resources		
 Measure materials using a 	Ore Production		
variety of scales.	Renewable resources		
 Describe relationships by 	Climate		
making inferences and			
predictions.			
• Communicate, use space /			
time relationships, define			
operationally, raise questions,			
formulate hypotheses, test and			
experiment,			
 Design controlled 			

experiments, recognize		
variables, and manipulate		
variables.		
Interpret data, formulate		
models, design models, and		
produce solutions.		
3.2.7.C Identify and use the		
elements of scientific inquiry to		
solve problems.		
Generate questions about		
objects, organisms and/or		
events that can be answered		
through scientific investigations		
Evaluate the appropriateness		
of questions		
Design an investigation with		
limited variables to investigate a		
question		
• Conduct a two-part		
evperiment • Judge the		
cignificance of experimental		
information in answering the		
question		
Communicate appropriate		
• confinuncate appropriate		
conclusions from the		
experiment.		
2.2.7.D. Know and use the		
5.2.7.D Kilow allu use tile		
solve problems.		
• Define different types of		
problems.		
• Define all aspects of the		
problem, necessary information		

and questions that must be		
answered.		
 Propose the best solution. 		
 Design and propose 		
alternative methods to achieve		
solutions.		
 Apply a solution. 		
• Explain the results, present		
improvements, identify and		
infer the impacts of the solution.		
3.5.7.A Describe earth features		
and processes.		
 Describe major layers of the 		
earth.		
 Describe the processes 		
involved in the creation of		
geologic features (e.g., folding,		
faulting, volcanism,		
sedimentation) and that these		
processes seen today (e.g.,		
erosion, weathering crustal		
plate movement) are similar to		
those in the past.		
 Describe the processes that 		
formed Pennsylvania geologic		
structures and resources		
including mountains, glacial		
formations, water gaps and		
ridges.		
 Explain how the rock cycle 		
affected rock formations in the		
state of Pennsylvania.		
 Distinguish between examples 		
of rapid surface changes (e.g.,		

landslides, earthquakes) and		
slow surface changes (e.g.,		
weathering).		
 Identify living plants and 		
animals that are similar to fossil		
forms.		
3.5.7.B Recognize earth		
resources and how they affect		
everyday life.		
 Identify and locate significant 		
earth resources (e.g., rock types,		
oil, gas, coal deposits) in		
Pennsylvania.		
 Explain the processes involved 		
in the formation of oil and coal		
in Pennsylvania.		
• Explain the value and uses of		
different earth resources (e.g.,		
selected minerals, ores, fuel		
sources, agricultural uses).		
• Compare the locations of		
human settlements as related to		
available resources.		
PA Core Standards:		
Reading for Science and		
Technical Subjects, 6-12		
3.5 Reading Informational Text		
Students read, understand, and		
respond to informational text-		
with emphasis on		
comprehension, making		
connections among ideas and		
between texts with focus on		

textual evidence.		
PA Core Standards: Writing for Science and Technical Subjects,		
6-12		
3.6 Writing		
Students write for different		
purposes and audiences.		
Students write clear and focused		
text to convey a well-defined		
perspective and appropriate		
content.		

General Topic	Anchor Descriptor	Eligible Content,	Resources & Activities	Assessments	Suggested
	PA Academic and Core	Essential Knowledge,			Time
	Standards	Skills & Vocabulary			(In Days)
Earth History	Anchor Descriptor:	Eligible Content:	Teacher made	Teacher prepared	58 Days
	S8.A.1.1 Explain, interpret, and	S8.D.1.1.1 Explain the rock	documents	tests, quizzes,	
Minerals	apply scientific, environmental,	cycle as changes in the solid		etc.	
	or technological knowledge	earth and rock types (igneous	Teacher prepared labs		
Earth is a Rock	presented in a variety of formats	– granite, basalt, obsidian,		Series available	
	(e.g., visuals, scenarios, graphs).	pumice; sedimentary –	Chromebooks	assessments	
Weathering and		limestone, sandstone, shale,	DVD Birth of Earth	online. (Optional)	
Erosion	S8.A.1.2 Identify and explain the	coal; and metamorphic –	DVD Grand Canyon		
	impacts of applying scientific,	slate, quartzite, marble,	DVD PBS Making		
Deposition	environmental, or technological	gneiss).	America		
	knowledge to address solutions		FOSS Lab		
Fossils and Past	to practical problems.	S8.D.1.1.2 Describe natural	Workbook/Worksheets		
Environments		processes that change Earth's	FOSS online		
	S8.A.1.3 Identify and analyze	surface (e.g., landslides,	animations/digital		
Rock Cycle	evidence that certain variables	volcanic eruptions,	content		
	may have caused measurable	earthquakes, mountain	FOSS Reference Book		
Plate Tectonics,	changes in natural or human-	building, new land being	Google Classroom		
Volcanoes, and	made systems.	formed, weathering, erosion,	Google Drive		
Earthquakes		sedimentation, soil	Google Form		
	S8.A.2.1 Apply knowledge of	formation).	Google Sheets		
The Earth is a	scientific investigation or		Lab activity comparing		
complex and	technological design in different	S8.D.1.1.3 Identify soil types	rocks from two		
dynamic set of	contexts to make inferences to	(i.e., humus, topsoil, subsoil,	locations at the Grand		
interconnected	solve problems.	loam, loess, and parent	Canyon		
systems (e.g.		material) and their	Lab activity identifying		
geosphere,	S8.A.2.2 Apply appropriate	characteristics (i.e., particle	limestone, sandstone,		
hydrosphere,	instruments for a specific	size, porosity, and	and shale		
atmosphere,	purpose and describe the	permeability) found in	Lab model formation of		
biosphere) that	information the instrument can	different biomes and in	Grand Canyon and		

•				
interact over a	provide.	Pennsylvania, and explain	steam table	
wide range of		how they formed.	Lab activity on types of	
temporal and	S8.A.3.1 Explain the parts of a		sand	
spatial scales.	simple system, their roles, and	S8.D.1.1.4 Explain how fossils	Lab activity making	
	their relationships to the system	provide evidence about	sedimentary rock layers	
	as a whole.	plants and animals that once	Lab activity on calcium	
		lived throughout	carbonate and lime	
	S8.A.3.2 Apply knowledge of	Pennsylvania's history (e.g.,	water	
	models to make predictions,	fossils provide evidence of	Lab activity crystals size	
	draw inferences, or explain	different environments).	and formation	
	technological concepts.		Lab activity igneous and	
			metamorphic rocks	
	S8.B.3.2 Identify evidence of		Lab Kit on Plate	
	change to infer and explain the	Essential Knowledge/Skills:	Tectonics	
	ways different variables may		Newsela website	
	affect change in natural or	All Earth processes are the	PBS Worksheet on deep	
	human-made systems.	result of energy flowing and	time	
		matter cycling within and	Prezi online slideshow	
	S8.D.1.1 Describe constructive	among the planet's systems.	Print out of notes for	
	and destructive natural	The energy is derived from	students	
	processes that form different	the sun and the earth's	Promethean Board	
	geologic structures and	interior. These flows and	Summative Assessment	
	resources.	cycles produce chemical and	Video worksheet	
		physical changes in Earth's	Video on weathering	
	PA Academic Standards:	materials and living	and erosion	
	Science	organisms.	Vocabulary	
			Worksheet on Plate	
	3.1.7.A Explain the parts of a	Major events in Earth's	Tectonics Lab	
	simple system and their	history leave evidence in the	Youtube class review	
	relationship to each other.	geologic record that allow	videos	
	 Describe a system as a group 	the construction of a		
	of related parts that work	geologic time scale based on		
	together to achieve a desired	relative ages.		
	result (e.g., digestive system).			
	Explain the importance of	The Earth's systems interact		

order in a system.	on various time and size		
 Distinguish between system 	scales. These interactions		
inputs, system processes and	have shaped Earth's history		
system outputs.	and will determine its		
 Distinguish between open 	future.		
loop and closed loop systems.			
Apply systems analysis to solve	Plate tectonics is the		
problems.	unifying theory that explains		
	the past, and current, and		
3.1.7.D Explain scale as a way of	future movements of the		
relating concepts and ideas to	rocks at Earth's surface and		
one another by some measure.	provides a framework for		
 Apply various applications of 	understanding its geological		
size and dimensions of scale to	history. Tectonic processes		
scientific, mathematical, and	continually generate new		
technological applications.	ocean seafloor at ridges and		
• Describe scale as a form of	destroy old seafloor at		
ratio and apply to a life	trenches.		
situation.			
	Some natural hazards such		
3.1.7.E Identify change as a	as volcanic eruptions and		
variable in describing natural	severe weather may be		
and physical systems.	preceded by phenomena		
Describe fundamental science	that allow for reliable		
and technology concepts that	prediction. Others such as		
could solve practical problems.	earthquakes occur suddenly		
 Explain how ratio is used to 	with no notice and are not		
describe change.	yet predictable.		
 Describe the effect of making 			
a change in one part of a system	Evolution is shaped by		
on the system as a whole.	Earth's varying geological		
	and environmental		
3.2.7.A Explain and apply	conditions. Sudden changes		
scientific and technological	in conditions (e.g., meteor		
knowledge.	impacts, major volcanic		

Distinguish between a	eruptions) have caused mass		
scientific theory and a belief.	extinctions, but these		
 Answer "What if" questions 	changes, as well as more		
based on observation, inference	gradual ones, have		
or prior knowledge or	ultimately allowed other life		
experience.	forms to flourish.		
 Explain how skepticism about 			
an accepted scientific	Minerals, fresh water, and		
explanation led to a new	living resources are limited,		
understanding.	and many are not renewable		
 Explain how new information 	or replaceable over human		
may change existing theories	lifetimes.		
and practice.			
	Classify rocks as one of three		
3.2.7.B Apply process	different types and explain		
knowledge to make and	the interrelationship of the		
interpret observations.	rock types as part of the rock		
 Measure materials using a 	cycle. (e.g., igneous: granite,		
variety of scales.	basalt, obsidian, pumice;		
 Describe relationships by 	sedimentary: limestone,		
making inferences and	sandstone, shale, coal; and		
predictions.	metamorphic: slate,		
 Communicate, use space / 	quartzite, marble, gneiss).		
time relationships, define			
operationally, raise questions,	Plan and carry out		
formulate hypotheses, test and	investigations that		
experiment,	investigate models of the		
 Design controlled 	chemical and physical		
experiments, recognize	processes that cycle earth		
variables, and manipulate	materials and form rocks.		
variables.			
 Interpret data, formulate 	Compare and contrast		
models, design models, and	various soil types and their		
produce solutions.	characteristics found in		
	different biomes (e.g,		

3.2.7.C Identify and use the	regionally, nationally,		
elements of scientific inquiry to	globally) and explain how		
solve problems.	they were formed.		
 Generate questions about 			
objects, organisms and/or	Use geologic evidence to		
events that can be answered	construct patterns and		
through scientific investigations.	determine the relative ages		
 Evaluate the appropriateness 	and sequence of geologic		
of questions.	events in Earth's 4.6 billion		
 Design an investigation with 	year history.		
limited variables to investigate a			
question.	Construct an explanation		
 Conduct a two-part 	based on evidence for how		
experiment. • Judge the	various processes have		
significance of experimental	changed Earth's surface at		
information in answering the	varying time and spatial		
question.	scales (e.g., short-term		
 Communicate appropriate 	deposition vs. mountain		
conclusions from the	building; short-term		
experiment.	weathering and erosion vs.		
	canyon or valley formation).		
3.2.7.D Know and use the			
technological design process to	Develop and use models of		
solve problems.	past plate motions to support		
 Define different types of 	explanations of existing		
problems.	patterns in the fossil record,		
 Define all aspects of the 	rock record, continental		
problem, necessary information	shapes and seafloor		
and questions that must be	structures.		
answered.			
 Propose the best solution. 	Incorporate a variety of data		
 Design and propose 	including geological evidence		
alternative methods to achieve	from maps and		
solutions.	representations of current		
 Apply a solution. 	plate motions to predict		

 Explain the results, present 	future plate motions.		
improvements, identify and			
infer the impacts of the solution.	Use models to explain how		
	the flow of energy		
3.4.7.B Relate energy sources	(convection of heat) drives		
and transfers to heat and	the cycling of matter		
temperature.	between Earth's surface and		
 Identify and describe sound 	deep interior.		
changes in moving objects.			
 Know that the sun is a major 	Investigate or develop a map		
source of energy that emits	of the past and present		
wavelengths of visible light,	natural hazards in a region to		
infrared and ultraviolet	demonstrate an		
radiation. • Explain the	understanding of forecasting		
conversion of one form of	the likelihood of future		
energy to another by applying	events and to inform designs		
knowledge of each form of	for development of		
energy.	technologies to mitigate their		
• Explain the parts and functions	effects.		
in an electrical circuit.			
	Use evidence from the rock		
3.4.7.D Describe essential ideas	and fossil records to		
about the composition and	construct arguments that		
structure of the universe and	explain how past changes in		
the earth's place in it.	earth's conditions have		
 Compare various planets' 	caused major extinctions of		
characteristics.	some life forms and allowed		
 Describe basic star types and 	others to flourish.		
identify the sun as a star type.			
 Describe and differentiate 	Use maps and other data to		
comets, asteroids and meteors.	explain how geologic		
 Identify gravity as the force 	processes have led to the		
that keeps planets in orbit	uneven distribution of Earth's		
around the sun and governs the	natural resources.		
rest of the movement of the			

solar system and the universe.	Vocabulary:		
 Illustrate how the positions of 	Abrasion		
stars and constellations change	Absolute age		
in relation to the Earth during an	Anthropocene		
evening and from month to	Asthenosphere		
month.	Basin		
 Identify equipment and 	Beach		
instruments that explore the	Bedding		
universe.	Biome		
 Identify the accomplishments 	Calcite		
and contributions provided by	Canyon		
selected past and present	Cenozoic		
scientists in the field of	Chalk		
astronomy.	Composition		
 Identify and articulate space 	Constructive processes		
program efforts to investigate	Continent		
possibilities of living in space	Continental drift		
and on other planets.	Convection		
	Convergence		
3.5.7.A Describe earth features	Coquina		
and processes.	Core		
 Describe major layers of the 	Correlate		
earth.	Cross-bedding		
 Describe the processes 	Cross-section		
involved in the creation of	Crust		
geologic features (e.g., folding,	Crust		
faulting, volcanism,	Crystal		
sedimentation) and that these	Debris fan		
processes seen today (e.g.,	Delta		
erosion, weathering crustal	Deposition		
plate movement) are similar to	Destructive processes		
those in the past.	Divergence		
 Describe the processes that 	Dune		
formed Pennsylvania geologic	Earthquake		
structures and resources	Ecology		

including mountains, glacial	Energy flow		
formations, water gaps and	Eon		
ridges.	Epoch		
 Explain how the rock cycle 	Era		
affected rock formations in the	Erosion		
state of Pennsylvania.	Eruption		
 Distinguish between examples 	Exposure		
of rapid surface changes (e.g.,	Extinction		
landslides, earthquakes) and	Extrusive		
slow surface changes (e.g.,	Fault		
weathering).	Flood		
 Identify living plants and 	Floodplain		
animals that are similar to fossil	Formation		
forms.	Fossil		
	Fossil record		
3.5.7.B Recognize earth	Frosted		
resources and how they affect	Geologic time		
everyday life.	Geological time		
 Identify and locate significant 	Geology		
earth resources (e.g., rock types,	Geoscientist		
oil, gas, coal deposits) in	Geosphere		
Pennsylvania.	Headwaters		
 Explain the processes involved 	Historical geology		
in the formation of oil and coal	Igneous rock		
in Pennsylvania.	Index		
 Explain the value and uses of 	Index fossils		
different earth resources (e.g.,	Inner core		
selected minerals, ores, fuel	Intrusive		
sources, agricultural uses).	Journal		
 Compare the locations of 	Landform		
human settlements as related to	Lava		
available resources.	Law of fossil succession		
	Law of superposition		
PA Core Standards:	Layer		
Reading for Science and	Lithification		

Technical Subjects, 6-12	Lithosphere		
3.5 Reading Informational Text	Magma		
Students read, understand, and	Mantle		
respond to informational text-	Mass		
with emphasis on	Matrix		
comprehension, making	Mesozoic		
connections among ideas and	Metamorphic rock		
between texts with focus on	Meteor impact		
textual evidence.	Mineral		
	Molten		
PA Core Standards: Writing for	Monocline		
Science and Technical Subjects,	Mountain		
6-12	Natural		
3.6 Writing	Öolith		
Students write for different	Outcrop		
purposes and audiences.	Outer core		
Students write clear and focused	Oxidation		
text to convey a well-defined	Paleontologist		
perspective and appropriate	Paleontology		
content.	Paleozoic		
	Period		
	Plain		
	Plate motion		
	Plate tectonics		
	Plateau		
	Precambrian		
	Rapids		
	Reef limestone		
	Relative age		
	Resources		
	Rock		
	Rock cycle		
	Rock record		
	Salol		
	Sample		

Scale	
Seafloor Spreading	
Sediment	
Sedimentary rock	
Soil horizons	
Solution	
Sorting	
Stalactite	
Stalagmite	
Strata	
Stratigraphy	
Superposition	
Travertine	
Tsunami	
Tufa	
Uniformitarianism	
Uplift	
Valley	
Volcanic	
Volcanoes	
Weathering	

General Topic	Anchor Descriptor	Eligible Content,	Resources & Activities	Assessments	Suggested
	PA Academic and Core	Essential Knowledge,			Time
	Standards	Skills & Vocabulary			(In Days)
Weather and	Anchor Descriptor:	Eligible Content:	Teacher made	Teacher prepared	63 Days
Water	S8.A.1.1 Explain, interpret, and	S8.A.2.2.1 Describe the	documents	tests, quizzes,	
	apply scientific, environmental,	appropriate use of		etc.	
Where's the Air?	or technological knowledge	instruments and scales to	Teacher prepared labs		
	presented in a variety of formats	accurately and safely		Series available	
Air Pressure and	(e.g., visuals, scenarios, graphs).	measure time, mass,	Chromebooks	assessments	
Wind		distance, volume, or	Climate Change Video	online. (Optional)	
	S8.A.1.2 Identify and explain the	temperature under a variety	worksheet		
Convection	impacts of applying scientific,	of conditions.	DVD Brain Games In		
	environmental, or technological		Living Color		
Radiation	knowledge to address solutions	S8.A.2.2.2 Apply appropriate	DVD Climate Change		
	to practical problems.	measurement systems (e.g.,	Nat Geo Bill Nye		
Conduction		time, mass, distance, volume,	FOSS Lab		
	S8.A.1.3 Identify and analyze	temperature) to record and	Workbook/Worksheets		
Air Flow	evidence that certain variables	interpret observations under	FOSS online		
	may have caused measurable	varying conditions.	animations/digital		
Water in the Air	changes in natural or human-		content		
	made systems.	S8.A.2.2.3 Describe ways	FOSS Reference Book		
Oceans		technology (e.g., microscope,	Google Classroom		
	S8.A.2.1 Apply knowledge of	telescope, micrometer,	Google Drive		
Human Caused	scientific investigation or	hydraulics, barometer)	Google Form		
Climate Change	technological design in different	extends and enhances	Google Sheets		
	contexts to make inferences to	human abilities for specific	IR Thermal Camera		
Meteorology	solve problems.	purposes.	Lab activity gas in		
			syringe		
The universe is	S8.A.2.2 Apply appropriate	S8.A.3.1.1 Describe a system	Lab activity does air		
composed of a	instruments for a specific	(e.g., watershed, circulatory	have mass using		
variety of	purpose and describe the	system, heating system,	balloons		
different objects	information the instrument can	agricultural system) as a	Lab activity pressure in		
which are	provide.	group of related parts with	a jar		
organized into		specific roles that work	Lab activity hard boiled		
systems, each of	S8.A.3.1 Explain the parts of a	together to achieve an	egg in a glass bottle		

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which develops	simple system, their roles, and	observed result.	Lab activity layering salt	
according to	their relationships to the system		solutions	
accepted physical	as a whole.	S8.A.3.1.2 Explain the	Lab activity lavering hot	
processes and		concept of order in a system	and cold water	
laws.	S8.A.3.2 Apply knowledge of	[e.g., (first to last:	Lab demonstration	
	models to make predictions.	manufacturing steps. trophic	convection chamber	
The Earth is a	draw inferences, or explain	levels): (simple to complex:	Lab Kit on Physical	
complex and	technological concepts.	cell. tissue. organ. organ	Oceanography sections	
dynamic set of		system)].	2, 3, 8, & 10	
interconnected	S8.A.3.3 Describe repeated	, , , , , , , , , , , , , , , , , , , ,	Lab activity solar	
systems (e.g.	processes or recurring elements	S8.A.3.2.1 Describe how	radiation heating the	
geosphere,	in natural, scientific, and	scientists use models to	Earth	
hydrosphere,	technological patterns.	explore relationships in	Lab activity on	
atmosphere,		natural systems (e.g., an	Radiation and Energy	
biosphere) that	S8.C.2.1 Describe energy	ecosystem, river system, the	Transfer	
interact over a	sources, transfer of energy, or	solar system).	Sun and Seasons	
wide range of	conversion of energy.		animated graphic	
temporal and		S8.A.3.2.2 Describe how	Direct Solar Energy	
spatial scales.	S8.C.2.2 Compare the	engineers use models to	demonstration	
	environmental impact of	develop new and improved	Lab activity on	
The Earth's	different energy sources chosen	technologies to solve	Conduction Aluminum	
processes affect	to support human endeavors.	problems.	and Steel in hot water	
and are affected			Lab on relative humidity	
by human	S8.D.1.3 Describe characteristic	S8.A.3.2.3 Given a model	Lab activity on	
activities.	features of Earth's water	showing simple cause and-	condensation and dew	
	systems or their impact on	effect relationships in a	point	
	resources.	natural system, predict	Lab activity Charles Law	
		results that can be used to	Lab activity making a	
	S8.D.2.1 Explain how pressure,	test the assumptions in the	Cloud in a bottle	
	temperature, moisture, and	model (e.g., photosynthesis,	Prezi online slideshow	
	wind are used to describe	water cycle, diffusion,	Print out of notes for	
	atmospheric conditions that	infiltration).	students	
	affect regional weather or		Promethean Board	
	climate.	S8.A.3.3.1 Identify and	Summative Assessment	
	S8.D.3.1 Explain the	describe patterns as	Vocabulary	

relationships botwash and	nemented museumenen	Maluma Matria Float	
relationships between and	repeated processes or	Volume Metric Flask	
among the objects of our solar	recurring elements in numan-	Worksheet on Physical	
system.	made systems (e.g., trusses,	Oceanography Lab	
	hub-and-spoke system in	youTube class review	
PA Academic Standards:	communications and	videos	
Science	transportation systems,		
	feedback controls in		
3.1.7.A Explain the parts of a	regulated systems).		
simple system and their			
relationship to each other.	S8.A.3.3.2 Describe repeating		
 Describe a system as a group 	structure patterns in nature		
of related parts that work	(e.g., veins in a leaf, tree		
together to achieve a desired	rings, crystals, water waves)		
result (e.g., digestive system).	or periodic patterns (e.g.,		
 Explain the importance of 	daily, monthly, annually).		
order in a system.			
Distinguish between system	S8.C.2.1.1 Distinguish among		
inputs, system processes and	forms of energy (e.g.,		
system outputs.	electrical, mechanical,		
 Distinguish between open 	chemical, light, sound,		
loop and closed loop systems.	nuclear) and sources of		
Apply systems analysis to solve	energy (i.e., renewable and		
problems.	nonrenewable energy)		
3.1.7.B Describe the use of	S8.C.2.1.2 Explain how		
models as an application of	energy is transferred from		
scientific or technological	one place to another through		
concepts.	convection, conduction, or		
 Identify and describe different 	radiation.		
types of models and their			
functions.	S8.C.2.2.1 Describe the Sun		
Apply models to predict	as the major source of energy		
specific results and observations	that impacts the		
(e.g., population growth, effects	environment.		
of infectious organisms).			

 Explain systems by outlining a 	S8.D.1.3.1 Describe the water		
system's relevant parts and its	cycle and the physical		
purpose and/or designing a	processes on which it		
model that illustrates its	depends (i.e., evaporation,		
function.	condensation, precipitation,		
	transpiration, runoff,		
3.1.7.C Identify patterns as	infiltration, energy inputs,		
repeated processes or recurring	and phase changes).		
elements in science and			
technology.	S8.D.1.3.2 Compare and		
 Identify different forms of 	contrast characteristics of		
patterns and use them to group	freshwater and saltwater		
and classify specific objects.	systems on the basis of their		
 Identify repeating structure 	physical characteristics (i.e.,		
patterns.	composition, density, and		
 Identify and describe patterns 	electrical conductivity) and		
that occur in physical systems	their use as natural		
(e.g., construction,	resources.		
manufacturing, transportation),			
informational systems and	S8.D.1.3.3 Distinguish among		
biochemical-related systems.	different water systems (e.g.,		
	wetland systems, ocean		
3.1.7.D Explain scale as a way of	systems, river systems,		
relating concepts and ideas to	watersheds) and describe		
one another by some measure.	their relationships to each		
 Apply various applications of 	other as well as to landforms.		
size and dimensions of scale to			
scientific, mathematical, and	S8.D.1.3.4 Identify the		
technological applications.	physical characteristics of a		
 Describe scale as a form of 	stream and how these		
ratio and apply to a life	characteristics determine the		
situation.	types of organisms found		
	within the stream		
3.1.7.E Identify change as a	environment (e.g., biological		
variable in describing natural	diversity, water quality, flow		

and physical systems.	rate, tributaries, surrounding		
 Describe fundamental science 	watershed).		
and technology concepts that			
could solve practical problems.	S8.D.2.1.1 Explain the impact		
 Explain how ratio is used to 	of water systems on the local		
describe change.	weather or the climate of a		
 Describe the effect of making 	region (e.g., lake effect snow,		
a change in one part of a system	land/ocean breezes).		
on the system as a whole.			
	S8.D.2.1.2 Identify how		
3.2.7.A Explain and apply	global patterns of		
scientific and technological	atmospheric movement		
knowledge.	influence regional weather		
 Distinguish between a 	and climate.		
scientific theory and a belief.			
 Answer "What if" questions 	S8.D.2.1.3 Identify how cloud		
based on observation, inference	types, wind directions, and		
or prior knowledge or	barometric pressure changes		
experience.	are associated with weather		
 Explain how skepticism about 	patterns in different regions		
an accepted scientific	of the country.		
explanation led to a new			
understanding.	S8.D.3.1.1 Describe patterns		
 Explain how new information 	of earth's movements (i.e.,		
may change existing theories	rotation and revolution) in		
and practice.	relation to the moon and sun		
	(i.e., phases, eclipses, and		
3.2.7.B Apply process	tides)		
knowledge to make and			
interpret observations.			
 Measure materials using a 	Essential Knowledge/Skills:		
variety of scales.			
 Describe relationships by 	Earth's spin axis is fixed in		
making inferences and	direction and tilted relative		
predictions.	to its orbit around the sun.		

• Communicate, use space /	The seasons are a result of		
time relationships, define	the Earth's tilt on its axis and		
operationally, raise questions,	are caused by the		
formulate hypotheses, test and	differential intensity of		
experiment,	sunlight on different areas of		
 Design controlled 	Earth throughout the year.		
experiments, recognize			
variables, and manipulate	Water continually cycles		
variables.	among geosphere,		
 Interpret data, formulate 	hydrosphere, biosphere, and		
models, design models, and	atmosphere via		
produce solutions.	transpiration, evaporation,		
	condensation, and		
3.2.7.C Identify and use the	precipitation.		
elements of scientific inquiry to			
solve problems.	Weather and climate are		
 Generate questions about 	influenced by interactions		
objects, organisms and/or	involving sunlight, the		
events that can be answered	ocean, the atmosphere, ice,		
through scientific investigations.	landforms, and living things.		
 Evaluate the appropriateness 	These interactions vary with		
of questions.	latitude, altitude and local		
 Design an investigation with 	and regional geography		
limited variables to investigate a	resulting in complex		
question.	patterns that are predicted		
 Conduct a two-part 	with varying degrees of		
experiment. • Judge the	reliability.		
significance of experimental			
information in answering the	The ocean and other large		
question.	bodies of water exert a		
Communicate appropriate	major influence on weather		
conclusions from the	and climate by absorbing		
experiment.	energy from the sun,		
	releasing it over time, and		
3.2.7.D Know and use the	globally redistributing it		

technological design process to through ocean curre	nts that
0 0	
solve problems. are driven by differe	nces in
• Define different types of density relative to	
problems. temperature and sal	inity.
 Define all aspects of the 	
problem, necessary information Human activities infl	luence
and questions that must be Earth's global tempe	erature,
answered. and these effects car	n be
Propose the best solution. mitigated through an	pplying
Design and propose knowledge of climat	e
alternative methods to achieve science, engineering	, etc.
solutions.	
• Apply a solution. Human activities have	ve la
• Explain the results, present significantly altered	the
improvements, identify and biosphere and geosp	ohere,
infer the impacts of the solution. sometimes damaging	g or
destroying natural h	abitats
3.4.4.D Describe the and causing the extin	nction of
composition and structure of other species.	
the universe and the earth's	
place in it. Use models of Earth'	S
 Recognize earth's place in the orientation and moti 	on to
solar system. explain how changes	in
• Explain and illustrate the intensity and duratio	n of
causes of seasonal changes. daily sunlight lead to	seasons.
 Identify planets in our solar 	
system and their general Identify and explain t	the
characteristics. position and orientat	tion of
Describe the solar system the Earth as it orbits	the Sun.
motions and use them to	
explain time (e.g., days, Develop models for t	he
seasons), major lunar phases movement of water v	within
and eclipses. the Earth's spheres (i.e.,
geosphere, hydrosph	nere,
3.4.7.D Describe essential ideas biosphere, atmosphe	ere).

about the composition and			
structure of the universe and	Compare and contrast		
the earth's place in it.	characteristics		
 Compare various planets' 	of freshwater and saltwater		
characteristics.	systems		
 Describe basic star types and 	on the basis of their physical		
identify the sun as a star type.	characteristics.		
 Describe and differentiate 			
comets, asteroids and meteors.	Investigate water systems to		
 Identify gravity as the force 	identify seasonal and annual		
that keeps planets in orbit	variations in precipitation		
around the sun and governs the	and streamflow and the		
rest of the movement of the	causes of those variations.		
solar system and the universe.			
 Illustrate how the positions of 	Assess the physical		
stars and constellations change	characteristics of a stream to		
in relation to the Earth during an	determine the types of		
evening and from month to	organisms found within the		
month.	stream environment.		
 Identify equipment and 			
instruments that explore the	Collect data and generate		
universe.	evidence to show how		
 Identify the accomplishments 	changes in weather		
and contributions provided by	conditions result from the		
selected past and present	movement, interactions, and		
scientists in the field of	area of origin of air masses		
astronomy.	(e.g., cold, dry Canadian air		
 Identify and articulate space 	mass vs. warm, moist		
program efforts to investigate	southern air mass).		
possibilities of living in space			
and on other planets.	Construct and use models to		
	support the explanation of		
3.5.7.C Describe basic elements	how the uneven distribution		
of meteorology.	of solar energy affects global		
 Explain weather forecasts by 	patterns in atmospheric and		

interpreting weather data and	oceanic circulation.		
symbols.			
 Explain the oceans' impact on 	Analyze weather patterns		
local weather and the climate of	using cloud types, wind		
a region.	directions, and barometric		
 Identify how cloud types, wind 	pressure.		
directions and barometric			
pressure changes are associated	Construct explanations from		
with weather patterns in	models of oceanic and		
different regions of the country.	atmospheric circulation, and		
 Explain and illustrate the 	for the development of local		
processes of cloud formation	and regional climates.		
and precipitation.			
 Describe and illustrate the 	Ask questions to clarify		
major layers of the earth's	evidence of the factors that		
atmosphere.	have caused the rise in global		
 Identify different air masses 	temperatures over the past		
and global wind patterns and	century.		
how they relate to the weather			
patterns in different regions of	Apply scientific principles to		
the U.S.	design a method for		
	monitoring and minimizing a		
3.5.7.D Explain the behavior and	human impact on the		
impact of the earth's water	environment.		
systems.			
 Explain the water cycle using 	Vocabulary:		
the processes of evaporation	Absorb		
and condensation.	Air		
 Describe factors that affect 	Air mass		
evaporation and condensation.	Air pressure		
 Distinguish salt from fresh 	Altimeter		
water (e.g., density, electrical	Altitude		
conduction).	Anemometer		
 Compare the effect of water 	Aneroid barometer		
type (e.g., polluted, fresh, salt	Anthropocene		

v	water) and the life contained in	Aphelion		
t	hem.	Atmosphere		
•	Identify ocean and shoreline	Atom		
fe	eatures, (e.g., bays, inlets, spit,	Axis		
ti	idal marshes).	Barometer		
		Bimetallic strip		
P	PA Core Standards:	Biosphere		
R	Reading for Science and	Blizzard		
т	Technical Subjects, 6-12	Carbon dioxide (CO2)		
3	3.5 Reading Informational Text	Cirrus		
S	Students read, understand, and	Climate		
r	espond to informational text-	Climatology		
v	with emphasis on	Cloud		
c	comprehension, making	Compass		
c	connections among ideas and	Condensation		
b	between texts with focus on	Condensation nucleus		
te	extual evidence.	Conduction		
		Contract		
P	PA Core Standards: Writing for	Convection		
S	cience and Technical Subjects,	Convection cell		
6	5-12	Coriolis effect		
3	3.6 Writing	Cumuliform		
S	Students write for different	Cumulus		
p	ourposes and audiences.	Cyclical pattern		
S	Students write clear and focused	Density		
t	ext to convey a well-defined	Dew		
p	perspective and appropriate	Dew point		
с	content.	Downburst		
		Drought		
		Dust devil		
		Dust storm		
		Earth		
		Energy		
		Equinox		
		Evaporation	 	

ExosphereExosphereExpandExpandEyeFlash floodFloodFloodFlow rateFlow rateFluidFreshwaterFrostGeography	
ExpandExpandEyeFlash floodFloodFloodFlow rateFlow rateFluidFreshwaterFrostGeography	
EyeFlash floodFloodFloodFlow rateFluidFreshwaterFrostGeography	
Flash floodFloodFlow rateFluidFreshwaterFrostGeography	
FloodFlow rateFluidFreshwaterFrostGeography	
Flow rateFluidFreshwaterFrostGeography	
Fluid Freshwater Frost Geography	
Freshwater Frost Geography	
Frost Geography	
Geography	
Glacier	
Global warming	
Global wind	
Greenhouse effect	
Groundwater	
Hail	
Heat	
Humidity	
Hurricane	
Hydrosphere	
Hygrometer	
Icecap	
Infiltration	
Ionosphere	
Kinetic energy	
Land breeze	
Latitude	
Lightning	
Liquid crystal	
Local wind	
Mass	
Matter	
Mesosphere	
Meteorologist	
Meteorology	

	Methane		
	Microburst		
	Millibar		
	Molecule		
	Nitrogen		
	Ocean systems		
	Oceanic circulation		
	Orbit		
	Orientation		
	Oxygen		
	Ozone		
	Perihelion		
	Permanent gas		
	Photosynthesis		
	Position		
	Precipitation		
	Prevailing wind direction		
	Radiant energy		
	Radiation		
	Radiosonde		
	Ray		
	Relative humidity		
	Reradiate		
	Revolution		
	River systems		
	Rotation		
	Runoff		
	Salinity		
	Saltwater		
	Saturated		
	Sea breeze		
	Season		
	Solar energy		
	Solstice		
	Step leader		
		-	

	Straight-line wind		
	Stratiform		
	Stratosphere		
	Stratus		
	Temperature		
	Thermometer		
	Thermosphere		
	Thunder		
	Thunderstorm		
	Tilt		
	Tornado		
	Transfer		
	Transpiration		
	Tributarv		
	Troposphere		
	Typhoon		
	Variable gas		
	Volume		
	Water cvcle		
	, Water System		
	, Water vapor		
	Watershed		
	Waterspout		
	Weather		
	Weather balloon		
	Weather factors		
	Weather Front		
	Wetland		
	Wind		
	Windstorm		

General Topic	Anchor Descriptor	Eligible Content,	Resources & Activities	Assessments	Suggested
	PA Academic and Core	Essential Knowledge,			Time
	Standards	Skills & Vocabulary			(In Days)
Origins the Sun,	Anchor Descriptor:	Eligible Content:	Teacher made	Teacher prepared	14 Days
the Solar System,	S8.A.1.1 Explain, interpret, and	S8.A.2.2.1 Describe the	documents	tests, quizzes, etc.	
and our Moon	apply scientific, environmental,	appropriate use of			
	or technological knowledge	instruments and scales to	Teacher prepared labs	Series available	
What is our	presented in a variety of formats	accurately and safely		assessments	
Cosmic Address?	(e.g., visuals, scenarios, graphs).	measure time, mass,	Chromebooks	online. (Optional)	
		distance, volume, or	Google Classroom		
The Big Bang	S8.A.1.2 Identify and explain the	temperature under a variety	Google Drive		
Theory	impacts of applying scientific,	of conditions.	Google Form		
	environmental, or technological		Google Sheets		
Origins of the Sun	knowledge to address solutions	S8.A.2.2.2 Apply appropriate	Lab on Relativity and		
	to practical problems.	measurement systems (e.g.,	Gravity		
How have		time, mass, distance, volume,	Lab on stars and outer		
observations	S8.A.1.3 Identify and analyze	temperature) to record and	solar system		
made by	evidence that certain variables	interpret observations under	Video on the Sun with		
scientists in the	may have caused measurable	varying conditions.	worksheet		
past contributed	changes in natural or human-		Activities and		
to our	made systems.	S8.A.2.2.3 Describe ways	demonstrations with		
understanding of		technology (e.g., microscope,	Telescope		
the Sun and the	S8.A.2.1 Apply knowledge of	telescope, micrometer,	Activity with the		
Universe?	scientific investigation or	hydraulics, barometer)	phases of the Moon		
	technological design in different	extends and enhances	Video on the Moon		
What is the Sun's	contexts to make inferences to	human abilities for specific	with worksheet		
structure and	solve problems.	purposes.			
source of energy?					
	S8.A.2.2 Apply appropriate	S8.C.1.1.2 Use characteristic			
How did the	instruments for a specific	physical or chemical			
Moon from?	purpose and describe the	properties to distinguish one			
	information the instrument can	substance from another (e.g.,			
What are the	provide.	density, thermal			
Moon's		expansion/contraction,			
properties?	S8.A.3.1 Explain the parts of a	freezing/melting points,			

The universe is	simple system, their roles, and	streak test).		
composed of a	their relationships to the system			
variety of	as a whole.	S8.C.2.1.1 Distinguish among		
different objects,		forms of energy (e.g.,		
which are	S8.A.3.2 Apply knowledge of	electrical, mechanical,		
organized into	models to make predictions,	chemical, light, sound,		
systems, each of	draw inferences, or explain	nuclear) and sources of		
which develops	technological concepts.	energy (i.e., renewable and		
according to		nonrenewable energy)		
accepted physical	S8.A.3.3 Describe repeated	radiation.		
processes and	processes or recurring elements			
laws.	in natural, scientific, and	S8.C.2.1.3 Describe how one		
	technological patterns.	form of energy (e.g.,		
		electrical, mechanical,		
	S8.C.1.1 Explain concepts about	chemical, light, sound,		
	the structure and properties	nuclear) can be converted		
	(physical and chemical) of	into a different form of		
	matter.	energy.		
	S8.C.2.1 Describe energy	S8.C.3.1.1 Describe forces		
	sources, transfer of energy, or	acting on objects (e.g.,		
	conversion of energy.	friction, gravity, balanced		
		versus unbalanced).		
	S8.C.3.1 Describe the effect of			
	multiple forces on the	S8.D.3.1.1 Describe patterns		
	movement, speed, or direction	of earth's movements (i.e.,		
	of an object.	rotation and revolution) in		
		relation to the moon and sun		
	S8.D.3.1 Explain the	(i.e., phases, eclipses, and		
	relationships between and	tides)		
	among the objects of our solar			
	system.	S8.D.3.1.2 Describe the role		
		of gravity as the force that		
	PA Academic Standards:	governs the movement of the		
	Science	solar system and universe.		

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3.1.7.A Explain the parts	of a S8.D.3.1.3 Compare and	
simple system and their	contrast characteristics of	
relationship to each othe	celestial bodies found in the	
 Describe a system as a 	group solar system (e.g., moons,	
of related parts that wor	asteroids, comets, meteors,	
together to achieve a des	ired inner and outer planets).	
result (e.g., digestive syst	em).	
 Explain the importance 	of	
order in a system.	Essential Knowledge/Skills:	
 Distinguish between sy 	tem	
inputs, system processes	and The phases of the Moon are	
system outputs.	caused by the orbit of the	
 Distinguish between op 	en moon around the Earth.	
loop and closed loop syst	ems.	
 Apply systems analysis 	o solve Observable patterns and	
problems.	changes in tides are caused	
	by the Earth-Moon-Sun	
3.1.7.B Describe the use	of system.	
models as an application	of	
scientific or technologica	Earth's spin axis is fixed in	
concepts.	direction and tilted relative	
 Identify and describe d 	iferent to its orbit around the sun.	
types of models and thei	The seasons are a result of	
functions.	the Earth's tilt on its axis and	
 Apply models to predic 	are caused by the	
specific results and obser	vations differential intensity of	
(e.g., population growth,	effects sunlight on different areas of	
of infectious organisms).	Earth throughout the year.	
 Explain systems by out 	ning a	
system's relevant parts a	nd its Earth and its solar system	
purpose and/or designing	a are part of the Milky Way	
model that illustrates its	Galaxy, which is one of many	
function.	galaxies in the universe.	
3.1.7.C Identify patterns	Identify and explain monthly	

repeated processes or recurring	patterns in the phases of the		
elements in science and	Moon.		
technology.			
 Identify different forms of 	Use a model of the relative		
patterns and use them to group	positions of the sun, earth		
and classify specific objects.	and moon to explain the		
 Identify repeating structure 	phases of the moon.		
patterns.			
 Identify and describe patterns 	Use models of the Earth-Sun-		
that occur in physical systems	Moon system to support		
(e.g., construction,	explanations and predict the		
manufacturing, transportation),	cyclic patterns of tides.		
informational systems and			
biochemical-related systems.	Use models of the Earth-Sun-		
	Moon system to support		
3.1.7.D Explain scale as a way of	explanations and predict the		
relating concepts and ideas to	cyclic patterns of eclipses.		
one another by some measure.			
 Apply various applications of 	Use models of Earth's		
size and dimensions of scale to	orientation and motion to		
scientific, mathematical, and	explain how changes in		
technological applications.	intensity and duration of		
 Describe scale as a form of 	daily sunlight lead to seasons.		
ratio and apply to a life			
situation.	Identify and explain the		
	position and orientation of		
3.2.7.A Explain and apply	the Earth as it orbits the Sun.		
scientific and technological			
knowledge.	Construct and use scale		
 Distinguish between a 	models to describe the		
scientific theory and a belief.	relationship of Earth to the		
 Answer "What if" questions 	rest of the solar system, the		
based on observation, inference	Milky Way Galaxy, and the		
or prior knowledge or	universe.		
experience.			

 Explain how skepticism about 	Vocabulary:		
an accepted scientific	altitude		
explanation led to a new	asteroid		
understanding.	asteroid belt		
 Explain how new information 	atmosphere		
may change existing theories	Axis		
and practice.	biosphere		
	bird's-eye view		
3.2.7.B Apply process	comet		
knowledge to make and	complex crater		
interpret observations.	core		
 Measure materials using a 	cosmos		
variety of scales.	crater		
 Describe relationships by 	crescent		
making inferences and	crescent Moon		
predictions.	crust		
 Communicate, use space / 	Cyclical pattern		
time relationships, define	diameter		
operationally, raise questions,	Earth		
formulate hypotheses, test and	ejecta		
experiment,	elevation		
 Design controlled 	equator		
experiments, recognize	equinox		
variables, and manipulate	first-quarter Moon		
variables.	flooded crater		
 Interpret data, formulate 	frame of reference		
models, design models, and	full Moon		
produce solutions.	Galaxy		
	geosphere		
3.2.7.C Identify and use the	gibbous		
elements of scientific inquiry to	Gravity		
solve problems.	gravity		
 Generate questions about 	highlands		
objects, organisms and/or	hydrosphere		
events that can be answered	impact		

through scientific investigations.	interacting		
 Evaluate the appropriateness 	latitude		
of questions.	light-year (ly)		
 Design an investigation with 	Local Group		
limited variables to investigate a	location		
question.	longitude		
 Conduct a two-part 	lunar		
experiment. • Judge the	Lunar Eclipse		
significance of experimental	Magellanic Cloud		
information in answering the	mantle		
question.	mare (maria)		
 Communicate appropriate 	meteor		
conclusions from the	meteorite		
experiment.	meteoroid		
	Milky Way		
3.2.7.D Know and use the	model		
technological design process to	Moon		
solve problems.	Neap tide		
 Define different types of 	nebula (nebulae)		
problems.	new Moon		
 Define all aspects of the 	North Star		
problem, necessary information	Oort Cloud		
and questions that must be	Orbit		
answered.	Orientation		
 Propose the best solution. 	Pattern		
 Design and propose 	Penumbra		
alternative methods to achieve	Phase		
solutions.	planet		
 Apply a solution. 	point of view		
 Explain the results, present 	Position		
improvements, identify and	ray		
infer the impacts of the solution.	regolith		
	Revolution		
3.4.4.D Describe the	rille		
composition and structure of	Rotation		

the universe and the earth's	rotation		
place in it.	Satellite		
 Recognize earth's place in the 	scaling factor		
solar system.	Season		
 Explain and illustrate the 	simple crater		
causes of seasonal changes.	solar		
 Identify planets in our solar 	solar angle		
system and their general	Solar Eclipse		
characteristics.	solar system		
 Describe the solar system 	solstice		
motions and use them to	Spring tide		
explain time (e.g., days,	star		
seasons), major lunar phases	subsystem		
and eclipses.	system		
	third-quarter Moon		
3.4.7.D Describe essential ideas	Tide System		
about the composition and	Tilt		
structure of the universe and	Umbra		
the earth's place in it.	Universe		
 Compare various planets' 	Waning		
characteristics.	Waxing		
 Describe basic star types and 			
identify the sun as a star type.			
 Describe and differentiate 			
comets, asteroids and meteors.			
 Identify gravity as the force 			
that keeps planets in orbit			
around the sun and governs the			
rest of the movement of the			
solar system and the universe.			
 Illustrate how the positions of 			
stars and constellations change			
in relation to the Earth during an			
evening and from month to			
month.			

 Identify equipment and 		
instruments that explore the		
universe.		
 Identify the accomplishments 		
and contributions provided by		
selected past and present		
scientists in the field of		
astronomy.		
 Identify and articulate space 		
program efforts to investigate		
possibilities of living in space		
and on other planets.		
PA Core Standards:		
Reading for Science and		
Technical Subjects, 6-12		
3.5 Reading Informational Text		
Students read, understand, and		
respond to informational text-		
with emphasis on		
comprehension, making		
connections among ideas and		
between texts with focus on		
textual evidence.		
PA Core Standards: Writing for		
Science and Technical Subjects,		
6-12		
3.6 Writing		
Students write for different		
purposes and audiences.		
Students write clear and focused		
text to convey a well-defined		
perspective and appropriate		
content.		

General Topic	Anchor Descriptor	Eligible Content,	Resources & Activities	Assessments	Suggested
	PA Academic and Core	Essential Knowledge,			Time
	Standards	Skills & Vocabulary			(In Days)
The Planets, Solar	Anchor Descriptor:	Eligible Content:	Teacher made	Teacher prepared	11 Days
System, and Life	S8.A.1.1 Explain, interpret, and	S8.A.2.2.1 Describe the	documents	tests, quizzes, etc.	
Cycle of Stars	apply scientific, environmental,	appropriate use of			
	or technological knowledge	instruments and scales to	Teacher prepared labs	Series available	
How are the inner	presented in a variety of formats	accurately and safely		assessments	
planets alike?	(e.g., visuals, scenarios, graphs).	measure time, mass,	Google Classroom	online. (Optional)	
		distance, volume, or	Google Drive		
How are the	S8.A.1.2 Identify and explain the	temperature under a variety	Google Form		
outer planets	impacts of applying scientific,	of conditions.	Google Sheets		
alike?	environmental, or technological		Lab Kit on Plantes		
	knowledge to address solutions	S8.A.2.2.2 Apply appropriate	Lab on spectroscopy		
What are some	to practical problems.	measurement systems (e.g.,	Newsela website		
characteristics of		time, mass, distance, volume,	Prezi online slideshow		
planetary moons?	S8.A.1.3 Identify and analyze	temperature) to record and	Print out of notes for		
	evidence that certain variables	interpret observations under	students		
What other	may have caused measurable	varying conditions.	Promethean Board		
objects are part	changes in natural or human-		Summative		
of the solar	made systems.	S8.A.2.2.3 Describe ways	Assessment		
system?		technology (e.g., microscope,	Vocabulary		
	S8.A.2.1 Apply knowledge of	telescope, micrometer,	youTube class review		
What are the	scientific investigation or	hydraulics, barometer)	videos		
phases of a star's	technological design in different	extends and enhances			
life cycle?	contexts to make inferences to	human abilities for specific			
	solve problems.	purposes.			
Ordinary baryonic					
matter makes up	S8.A.2.2 Apply appropriate	S8.C.1.1.2 Use characteristic			
less than 5% of	instruments for a specific	physical or chemical			
the Universe, so	purpose and describe the	properties to distinguish one			
what is the rest?	information the instrument can	substance from another (e.g.,			
	provide.	density, thermal			

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The universe is	S8.A.3.1 Explain the parts of a	expansion/contraction,		
composed of a	simple system, their roles, and	freezing/melting points,		
variety of	their relationships to the system	streak test).		
different objects,	as a whole.			
which are		S8.C.2.1.1 Distinguish among		
organized into	S8.A.3.2 Apply knowledge of	forms of energy (e.g.,		
systems, each of	models to make predictions,	electrical, mechanical,		
which develops	draw inferences, or explain	chemical, light, sound,		
according to	technological concepts.	nuclear) and sources of		
accepted physical		energy (i.e., renewable and		
processes and	S8.A.3.3 Describe repeated	nonrenewable energy)		
laws.	processes or recurring elements	radiation.		
	in natural, scientific, and			
	technological patterns.	S8.C.2.1.3 Describe how one		
		form of energy (e.g.,		
	S8.C.1.1 Explain concepts about	electrical, mechanical,		
	the structure and properties	chemical, light, sound,		
	(physical and chemical) of	nuclear) can be converted		
	matter.	into a different form of		
		energy.		
	S8.C.2.1 Describe energy			
	sources, transfer of energy, or	S8.C.3.1.1 Describe forces		
	conversion of energy.	acting on objects (e.g.,		
		friction, gravity, balanced		
	S8.C.3.1 Describe the effect of	versus unbalanced).		
	multiple forces on the			
	movement, speed, or direction	S8.D.3.1.1 Describe patterns		
	of an object.	of earth's movements (i.e.,		
		rotation and revolution) in		
	S8.D.3.1 Explain the	relation to the moon and sun		
	relationships between and	(i.e., phases, eclipses, and		
	among the objects of our solar	tides)		
	system.			
		S8.D.3.1.2 Describe the role		
		of gravity as the force that		

PA Academic Standards:	governs the movement of the		
Science	solar system and universe.		
3.1.7.A Explain the parts of a	S8.D.3.1.3 Compare and		
simple system and their	contrast characteristics of		
relationship to each other.	celestial bodies found in the		
 Describe a system as a group 	solar system (e.g., moons,		
of related parts that work	asteroids, comets, meteors,		
together to achieve a desired	inner and outer planets).		
result (e.g., digestive system).			
 Explain the importance of 			
order in a system.	Essential Knowledge/Skills:		
 Distinguish between system 	0.		
inputs, system processes and	Earth and its solar system		
system outputs.	are part of the Milky Way		
 Distinguish between open 	Galaxy, which is one of many		
loop and closed loop systems.	galaxies in the universe.		
 Apply systems analysis to solve 	0		
problems.	Our solar system is a		
	collection of objects,		
3.1.7.B Describe the use of	including planets, their		
models as an application of	moons, and asteroids that		
scientific or technological	are held in orbit around the		
concepts.	Sun by its gravitational pull		
 Identify and describe different 	on them.		
types of models and their			
functions.	Construct and use scale		
 Apply models to predict 	models to describe the		
specific results and observations	relationship of Earth to the		
(e.g., population growth, effects	rest of the solar system, the		
of infectious organisms).	Milky Way Galaxy, and the		
 Explain systems by outlining a 	universe.		
system's relevant parts and its			
purpose and/or designing a	Construct and use scale		
model that illustrates its	models of the solar system to		

function.	support the explanation of		
	the role of gravity in the		
3.1.7.C Identify patterns as	motions of the planets of the		
repeated processes or recurring	observed system.		
elements in science and			
technology.	Analyze and interpret data to		
 Identify different forms of 	determine scale properties		
patterns and use them to group	(i.e. distance from sun,		
and classify specific objects.	diameter, etc.) of objects in		
 Identify repeating structure 	the solar system.		
patterns.			
 Identify and describe patterns 	Vocabulary:		
that occur in physical systems	absorption line		
(e.g., construction,	accretion		
manufacturing, transportation),	anthropocene		
informational systems and	Asteroids		
biochemical-related systems.	astronomical unit (AU)		
	atmosphere		
3.1.7.D Explain scale as a way of	barycenter		
relating concepts and ideas to	big bang theory		
one another by some measure.	binary star		
 Apply various applications of 	bird's-eye view		
size and dimensions of scale to	black hole		
scientific, mathematical, and	Doppler shift		
technological applications.	dwarf planet		
 Describe scale as a form of 	ecosystem		
ratio and apply to a life	electromagnetic spectrum		
situation.	emission line		
	emit		
3.2.7.A Explain and apply	exoplanet		
scientific and technological	fossil fuel		
knowledge.	fracking		
 Distinguish between a 	Galaxy		
scientific theory and a belief.	Gravity		
 Answer "What if" questions 	greenhouse gas		

based on observation, inference	Kuiper Belt		
or prior knowledge or	light signature		
experience.	light-year (ly)		
 Explain how skepticism about 	Local Group		
an accepted scientific	Magellanic Cloud		
explanation led to a new	meteorite		
understanding.	Milky Way		
 Explain how new information 	Moon		
may change existing theories	nebula (nebulae)		
and practice.	nonrenewable		
	Orbit		
3.2.7.B Apply process	orbital period		
knowledge to make and	orbital radius		
interpret observations.	orrery		
 Measure materials using a 	planetesimal		
variety of scales.	plutoid		
 Describe relationships by 	radiometer		
making inferences and	red giant		
predictions.	renewable		
 Communicate, use space / 	Satellite		
time relationships, define	Satellite Solar system		
operationally, raise questions,	Solar system		
formulate hypotheses, test and	spectroscope		
experiment,	spectrum		
 Design controlled 	star cluster		
experiments, recognize	supernova		
variables, and manipulate	transit		
variables.	Universe		
 Interpret data, formulate 	visible light		
models, design models, and	wavelength		
produce solutions.	white dwarf		
	wobble method		
3.2.7.C Identify and use the			
elements of scientific inquiry to			
solve problems.			

 Generate questions about 		
objects, organisms and/or		
events that can be answered		
through scientific investigations.		
 Evaluate the appropriateness 		
of questions.		
 Design an investigation with 		
limited variables to investigate a		
question.		
 Conduct a two-part 		
experiment. • Judge the		
significance of experimental		
information in answering the		
question.		
 Communicate appropriate 		
conclusions from the		
experiment.		
3.2.7.D Know and use the		
technological design process to		
solve problems.		
 Define different types of 		
problems.		
 Define all aspects of the 		
problem, necessary information		
and questions that must be		
answered.		
 Propose the best solution. 		
 Design and propose 		
alternative methods to achieve		
solutions.		
 Apply a solution. 		
 Explain the results, present 		
improvements, identify and		
infer the impacts of the solution.		

3.4.4.D Describe the		
composition and structure of		
the universe and the earth's		
place in it.		
 Recognize earth's place in the 		
solar system.		
 Explain and illustrate the 		
causes of seasonal changes.		
 Identify planets in our solar 		
system and their general		
characteristics.		
 Describe the solar system 		
motions and use them to		
explain time (e.g., days,		
seasons), major lunar phases		
and eclipses.		
2.4.7.D. Describe acceptial ideas		
3.4.7.D Describe essential lideas		
about the composition and		
the earth's place in it		
Compare various planets'		
characteristics		
Describe basic star types and		
identify the sun as a star type		
Describe and differentiate		
comets, asteroids and meteors.		
• Identify gravity as the force		
that keeps planets in orbit		
around the sun and governs the		
rest of the movement of the		
solar system and the universe.		
• Illustrate how the positions of		
stars and constellations change		

in relation to the Earth during an		
evening and from month to		
month.		
 Identify equipment and 		
instruments that explore the		
universe.		
 Identify the accomplishments 		
and contributions provided by		
selected past and present		
scientists in the field of		
astronomy.		
 Identify and articulate space 		
program efforts to investigate		
possibilities of living in space		
and on other planets.		
PA Core Standards:		
Reading for Science and		
Technical Subjects, 6-12		
3.5 Reading Informational Text		
Students read, understand, and		
respond to informational text-		
with emphasis on		
comprehension, making		
connections among ideas and		
between texts with focus on		
textual evidence.		
PA Core Standards: Writing for		
Science and Technical Subjects		
6-12		
3.6 Writing		
Students write for different		
purposes and audiences.		
Students write clear and focused		

text to convey a well-defined		
perspective and appropriate		
content.		

General Topic	Anchor Descriptor	Eligible Content,	Resources & Activities	Assessments	Suggested
		Essential Knowledge,			Time
		Skills & Vocabulary			(In Days)
Review and Final					4 Days
Exam					

PA Core Standards:

Reading for Science and Technical Subjects, 6-12

3.5 Reading Informational Text

Students read, understand, and respond to informational text-with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence.

Grades 6-8

CC.3.5.6-8.A. Cite specific textual evidence to support analysis of science and technical texts.

CC.3.5.6-8.B.

Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

CC.3.5.6-8.C.

Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CC.3.5.6-8.D.

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

CC.3.5.6-8.E.

Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

CC.3.5.6-8.F.

Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

CC.3.5.6-8.G.

Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CC.3.5.6-8.H.

Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

CC.3.5.6-8.I.

Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

CC.3.5.6-8.J.

By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

PA Core Standards:

Writing for Science and Technical Subjects, 6-12

3.6 Writing

Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.

Grades 6-8

CC.3.6.6-8.A.

Write arguments focused on discipline-specific content.

- Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
- Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
- Use words, phrases, and clauses to create cohesion and clarify the relationships among claims), counterclaims, reasons, and evidence.
- Establish and maintain a formal style.
- Provide a concluding statement or section that follows from and supports the argument presented.

CC.3.6.6-8.B. *

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

- Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
- Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
- Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
- Use precise language and domain-specific vocabulary to inform about or explain the topic.
- Establish and maintain a formal style and objective tone.
- Provide a concluding statement or section that follows from and supports the information or explanation presented.

CC.3.6.6-8.C.

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CC.3.6.6-8.D.

With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.

CC.3.6.6-8.E.

Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

CC.3.6.6-8.F.

Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

CC.3.6.6-8.G.

Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

CC.3.6.6-8.H.

Draw evidence from informational texts to support analysis reflection, and research.

CC.3.6.6-8.J.I.

Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.