Unit Name	Energy Forms & Transformations	States of Matter, Phase Changes, & Thermal Energy	Atomic Structure, Periodic Table, & LOCOM	Classification & Properties of Matter	Waves	Non-Contact Forces	Motion & Newton's Laws	Aviation Capstone
CAPSTONE Connective Theme	Energy Forms & Transformations in Aircraft	Effects of Temperature on Aircraft Performance	Elements in Flight	Sustainable Fuel Sources for Aviation	Aeronautical Applications of Waves	Magnetic, Electrical, & Gravitational Fields in Aviation	Forces in Flight	Science in Aviation: Curating A Collection for an Aviation Museum
Time Frame	5 Weeks	3.5 Weeks	4 Weeks	4 Weeks	5 Weeks	4 Weeks	4 Weeks	3 Weeks
Standards	S8P2.a., b., c.	S8P1.b / S8P2.d	S8P1.e., f.	S8P1.a., c., d.	S8P4.a., b., c., d., e., f., g.	S8P5.a., b., c.	S8P3.a., b., c.	S8P1 - S8P5
Gifted Standards	S3A, S3C, S5A, S6A,	S1A, S1B, S4A	S2A, S4D	S1C, S2B, S2D, S5E	S4B, S4C, S4E, S5D	S2C, S3B, S6E	S5B, S5C, S6C, S6D	S1B, S1C, S4E, S6B
Science & Engineering Practices	Students will: Analyze and interpret data to create graphical displays that illustrate the relationships of kinetic energy to mass and speed and potential energy to mass and height of an object. Plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g. roller coasters, pendulums, rubber bands, etc.). Construct an argument to support a claim	Students will: Develop and use models to describe the movement of particles in solids, liquids, gasses, and plasma states when thermal energy is added or removed. Plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or gas (convection).	Students will: Develop models (e.g., atomic level models, including drawings, and computer representations) by analyzing patterns within the periodic table that illustrate the structure, composition, and characteristics of atoms (protons, neutrons, electrons) and simple molecules. Construct an explanation based on evidence to describe conservation of matter in a chemical reaction	Students will: Develop and use a model to compare and contrast pure substances and mixtures. Plan and carry out investigations to compare and contrast chemical (i.e., reactivity, combustibility) and physical (i.e., density, melting point, boiling point) properties of matter. Construct an argument based on observational evidence to support the claim that when a change in a substance occurs,	Students will: Ask questions to develop explanations about the similarities and differences between electromagnetic and mechanical waves. Construct an explanation using data to illustrate the relationship between the electromagnetic spectrum and energy. Design a device to illustrate the practical applications of the electromagnetic spectrum (e.g., communication, medical, military). Develop and use a model to compare and contrast how light and sound waves are reflected, refracted, absorbed,	Students will: Construct an argument using evidence to support the claim that fields (i.e., magnetic fields, gravitational fields, and electric fields) exist between objects exerting forces on each other even when the objects are not in contact. Plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators.	Students will: Analyze and interpret data to identify patterns in the relationships between speed and distance, and velocity and acceleration. Construct an explanation using Newton's Laws of Motion to describe the effects of balanced and unbalanced forces on the motion of an object. Construct an argument from evidence to support the claim that the amount	Students will have the opportunity to engage in one or more of the following:

		1		Tota science o subje	ct Group Overview	Г	Ι	
	about the type of		including the	it can be	diffracted, or transmitted	Plan and carry	of force needed	
	energy		resulting	classified as	through various	out investigations	to accelerate an	
	transformations		differences	either chemical	materials.	to identify the	object is	
	within a system		between	or physical.	Develop and use a model	factors (e.g.,	proportional to	
	[e.g., lighting a		products and		(e.g., simulations, graphs,	distance between	its mass (inertia)	
	match (light to		reactants.		illustrations) to predict	objects, magnetic		
	heat), turning on a				and describe the	force produced		
	light (electrical to				relationships between	by an		
	light).				wave properties (e.g.,	electromagnet		
					frequency, amplitude,	with varying		
					and wavelength) and	number of wire		
					energy.	turns, varying		
					 Develop and use 	number or size of		
					models to	dry cells, and		
					demonstrate the	varying size of		
					effects that lenses	iron core) that		
					have on light (i.e.	affect the		
					formation of an image)	strength of		
					and their possible	electric and		
					technological	magnetic forces.		
					applications.			
Approaches	Self-Management:	Communication:	Critical Thinking:	Communication:	Critical Thinking: Use	Critical Thinking:	Research: Collect	Creative Thinking:
To Learning	Organization: Bring	Read critically and	Identify trends and	Make inferences	models and	Make logical,	and analyze data to	Generating novel
Instructional	necessary equipment	for comprehension.	forecast possibilities	and draw	simulations to explore	reasonable	identify solutions	ideas and considering
Strategies	and supplies to class.			conclusions.	complex systems and	judgments and	and/or make	new perspectives.
		Communication:	Reflection: Consider		issues.	create arguments	informed decisions.	Transfer skills:
	Self-Management:	Take effective notes	content:	Communication:		to support them.		Combine knowledge,
	Affective: Practice	in class.	-What did I learn	Negotiate ideas and	Collaboration: Work		Critical Thinking:	understanding and
	focus and		about today?	knowledge with	effectively with	Social:	Consider	skills to create
	concentration.	Research: Collect	-What don't I	peers and teachers.	others.	Collaboration:	consequences to	products or solutions.
		and analyze data to	understand?			Delegate and take	events.	
	Research: Collect and	identify solutions	-What questions do I	Research: Collect	Research: Collect and	responsibility as		Research: Collect and
	analyze data to	and/or make	have now?	and analyze data to	analyze data to identify	appropriate.	Research: Collect	analyze data to
	identify solutions	informed decisions.	That criow.	identify solutions	solutions and/or make	appropriate.	and analyze data to	identify solutions and
	and/or make	imornica accisions.	Research: Collect	and/or make	informed decisions.	Research: Collect	identify solutions	make informed
	informed decisions.		and analyze data to	informed decisions.	illioillea decisions.	and analyze data	and/or make	decisions.
	illioillieu decisiolis.		I -	illioilleu decisiolis.		to identify	informed decisions.	uccisions.
			identify solutions			,	mnormed decisions.	Communication
			and/or make			solutions and/or		Communication:
			informed decisions.			make informed		Collaborate with
		1		1		decisions.		peers and experts
								using a variety of

								digital environments and media.
Statement	Scientific and	Scientific and technical	Scientific and technical	Scientists and	Advances in science and	Scientific and	Scientific and	Scientific and technica
of Inquiry	technical	innovations enable us to	advancements enable	technical	technology have	technical	technical	innovations have
	advancements have	use thermal energy	scientists to	innovations allow us	developed humans'	innovations allow us	advancements have	enhanced the
	led to the	changes for practical	understand	to visualize, model,	understanding of the uses,	to understand the	led to the	development of
	development of	applications.	relationships and	and explain	behaviors, and effects of	relationships	development of a	aviation by capitalizing
	multiple systems that		patterns that exist	properties of and	electromagnetic and	between objects in	variety of models that	on the relationships
	facilitate energy	Aviation Phenomenon:	related to the	changes in systems	mechanical energy.	magnetic,	can be used to	and interactions
	transformations.	How are planes	structure and function	of matter.		gravitational, and	demonstrate changes	between chemistry,
		designed and	of elements in our		Aviation Phenomena:	electric fields.	in motion of balanced	physics, and
	<u>Aviation</u>	manufactured to	natural world.	<u>Aviation</u>	How are the		and unbalanced forces	engineering.
	<u>Phenomena</u> :	withstand extreme		<u>Phenomena:</u>	characteristics and	<u>Aviation</u>	on objects.	
	How do energy forms	temperature changes?	<u>Aviation</u>	How can chemical	properties of EM and	Phenomena:		Aviation Phenomena:
	and transformations		<u>Phenomena</u> :	or physical	mechanical waves	How do magnetic,	<u>Aviation</u>	How can we use our
	impact flight		How can the Periodic	properties of pure	applied in aeronautics?	electrical, and	Phenomena:	mastery of core ideas
	operations?		Table be used to	substances and		gravitational fields	How is flight possible	in physical science to
			determine	mixtures help		support and/or	with Newton's Laws	increase community
			characteristics of	identify sustainable		impact aviation?	of Motion?	engagement in our
			elements that are	fuel options for				local aviation
			useful in flight?	aircraft?				museum?
CER	Students answer the ph	nenomenon in a Claim-Ev	idence-Reasoning constr	ructed response as a for	mative assessment. Allow st	cudents to make edits	to their constructed	
	· ·	ne unit for a final summat	_					

Global	Scientific and	Scientific and	Scientific and	Scientific and	Scientific and Technical	Scientific and	Scientific and	Scientific and
Context	Technical Innovation	Technical Innovation	Technical Innovation	Technical	Innovation	Technical	Technical Innovation	Technical Innovation
	Students will explore	Students will explore	Students will explore	Innovation	Students will explore the	Innovation	Students will explore	Students will explore
	the natural world and	the natural world	the natural world	Students will	natural world and its	Students will	the natural world	the natural world and
	its laws; the	and its laws; the	and its laws; the	explore the natural	laws; the interaction	explore the	and its laws; the	its laws; the
	interaction between	interaction between	interaction between	world and its laws;	between people and the	natural world and	interaction between	interaction between
	people and the	people and the	people and the	the interaction	natural world; how	its laws; the	people and the	people and the
	natural world; how	natural world; how	natural world; how	between people	humans use their	interaction	natural world; how	natural world; how
	humans use their	humans use their	humans use their	and the natural	understanding of	between people	humans use their	humans use their
	understanding of	understanding of	understanding of	world; how humans	scientific principles; the	and the natural	understanding of	understanding of
	scientific principles;	scientific principles;	scientific principles;	use their	impact of scientific and	world; how	scientific principles;	scientific principles;
	the impact of	the impact of	the impact of	understanding of	technological advances	humans use their	the impact of	the impact of
	scientific and	scientific and	scientific and	scientific principles;	on communities and	understanding of	scientific and	scientific and
	technological	technological	technological	the impact of	environments; the	scientific	technological	technological
	advances on	advances on	advances on	scientific and	impact of environments	principles; the	advances on	advances on
	communities and	communities and	communities and	technological	on human activity; how	impact of scientific	communities and	communities and
	environments; the	environments; the	environments; the	advances on	humans adapt	and technological	environments; the	environments; the
	impact of	impact of	impact of	communities and	environments to their	advances on	impact of	impact of
	environments on	environments on	environments on	environments; the	needs.	communities and	environments on	environments on
	human activity; how	human activity; how	human activity; how	impact of		environments; the	human activity; how	human activity; how
	humans adapt	humans adapt	humans adapt	environments on		impact of	humans adapt	humans adapt
	environments to their	environments to	environments to	human activity;		environments on	environments to	environments to their
	needs.	their needs.	their needs.	how humans adapt		human activity;	their needs.	needs.
				environments to		how humans		
				their needs.		adapt		
						environments to		
						their needs.		

Var	Custome and sustain	Change (NAVD/CCC)	1	•	Development (MVD)	Dolotic nahina	Custome and sustain	Deletionships (NAVD)
Key	Systems and system	Change (MYP/CCC)	Relationships (MYP)	Change (MYP/CCC)	Development (MYP)	Relationships	Systems and system	Relationships (MYP)
Concepts	models (MYP/CCC)	Change is a	Relationships are the	Change is a	Development is the act	(MYP)	models (MYP/CCC)	Relationships are the
	Systems are sets of	conversion,	connections and	conversion,	or process of growth,	Relationships are	Systems are sets of	connections and
	interacting or	transformation or	associations	transformation or	progress or evolution,	the connections	interacting or	associations between
	interdependent	movement from one	between properties,	movement from	sometimes through	and associations	interdependent	properties, objects,
	components.	form, state, or value	objects, people and	one form, state, or	iterative improvements.	between	components.	people and ideas -
	Systems provide	to another. Inquiry	ideas - including the	value to another.		properties,	Systems provide	including the human
	structure and order in	into the concept of	human community's	Inquiry into the		objects, people	structure and order	community's
	human, natural and	change involves	connections with the	concept of change		and ideas -	in human, natural	connections with the
	built environments.	understanding and	world in which we	involves		including the	and built	world in which we
	Systems can be static	evaluating causes,	live. Any change in a	understanding and		human	environments.	live. Any change in a
	or dynamic, simple or	processes and	relationship brings	evaluating causes,		community's	Systems can be static	relationship brings
	complex.	consequences.	consequences.	processes and		connections with	or dynamic, simple	consequences.
				consequences.		the world in which	or complex.	
						we live. Any		
						change in a		
						relationship brings		
						consequences.		
Related	Energy (MYP/CCC)	Energy (MYP/CCC)	Patterns (MYP/CCC)	Models (MYP)	Effects (MYP)	Interaction (MYP)	Movement (MYP)	Interaction (MYP)
Concepts	Transformation (MYP)							Development (MYP)
Disciplinary	Connecting Core	Connecting Core	Connecting Core	Connecting Core	Connecting Core Ideas	Connecting Core	Connecting Core	Connecting Core
Core Ideas	<u>Ideas</u>	<u>Ideas</u>	<u>Ideas</u>	<u>Ideas</u>	 Wave Properties 	<u>Ideas</u>	<u>Ideas</u>	<u>Ideas</u>
	Energy	 Matter 	 Matter 	 Matter 	(frequency,	Forces	Energy	Energy
	Energy	(structure,	(structure,	(structure,	amplitude,	(friction,	 Kinetic and 	 Matter
	Transformations	composition,	composition,	composition,	wavelength, and	gravitational,	Potential	Waves
	Kinetic &	properties)	properties)	properties)	energy)	electrical,	 Force and 	Fields
	Potential	 Thermal Energy 	 Elements and 	 Mixtures and 	Energy	and	Motion	 Forces & Motion
		 States of Matter 	Compounds	solutions	(electromagnetic	magnetic)	 Speed and 	
			 Conservation of 	Elements and	spectrum)	 Force fields 	Distance	
			Matter	compounds	 Light and Sound 	 Conductors 	 Speed and 	
				Chemical and	Wave Propagation	and	Acceleration	
1								
				Physical	(reflection,	insulators	 Newton's Laws 	
					(reflection, refraction,	insulators	 Newton's Laws of Motion 	
				Properties and	refraction,	insulators	of Motion	
					refraction, absorption,	insulators	of Motion Balanced and	
				Properties and	refraction, absorption, diffraction,	insulators	of Motion Balanced and Unbalanced	
				Properties and	refraction, absorption,	insulators	of Motion Balanced and	

MYP	Common	Common	Common	Common	Common Assessments	Common	Common	Common
Assessments	Assessments Title	Assessments Title	Assessments Title	Assessments Title	Title and Criterion:	Assessments Title	Assessments Title	Assessments Title
/	and Criterion:	and Criterion:	and Criterion:	and Criterion:		and Criterion:	and Criterion:	and Criterion:
Performance					Waves Unit Assessment			
Tasks	Energy Forms and	States of Matter,	Atomic Structure &	Classification &	Paper I and Paper II	Non-Contact	Motion & Newton's	Culminating Capstone
	Transformations Unit	Phase Changes, &	Periodic Table Unit	Properties of	(Science: A,D)	Forces Unit	Laws Unit	Product/Presentation
	Assessment Paper I	Thermal Energy Unit	Assessment Paper I	Matter Unit		Assessment Paper	Assessment Paper I	
	and II (Science: A,D)	Assessment Paper I	and Paper II	Assessment Paper I	Lab/SIM: Exploring Wave	I (Science: A,D)	and Paper II	MYP Science A.i.
		(Science A,D)	(Science: A,D)	(Science: A,D)	Properties (Science: B,C)		(Science: A,D)	MYP Science D.i iv.
	Lab/SIM: Ball Drop					Graphing Gravity		
	(Science B,C)	States of Matter	Hands-On/SIM: Build	Lab: Separating	Labs/Stations: Exploring		Analyzing and	MYP Design A.ii.
		Choice Board	an Atom	Mixtures (Design	Wave Behaviors	Design an	Interpreting Motion	MYP Design B.i., iii., iv.
	MYP Aviation Energy			A-D)	(Science: B,C)	Electromagnet	Graphs	MYP Design C.iv.
	Design Challenge	Lab/SIM: Exploring	Aviation Periodic			(Design: B-D)		MYP Design D.ii., iii.,
	(Design: A-D)	Thermal Energy	Table	Lab: Density	Data Analysis &		DE: Boeing Future U:	iv.
		Transfer Between			Interpretation: Wave	Labs/Stations/	Boeing 360	
		Various Materials	Lab: Chemical	DE: Boeing Future	Speed Through Various	SIMS: Investigating	Experience: Flight	
		(Science A-D)	Reactions and the	U: Boeing 360	Media	Electrostatics	Path/Forces of Flight	
			LOCOM (Science:	Experience:	_	(Science: B,C)	Experience (Science	
			B,C)	Sustainable	Lab: Lenses (Science:		B,C)	
				Aviation (Science	B,C)	Research:		
				B,C)	_	Investigating the	Lab: Using Spring	
					Electromagnetic	Impact of	Scales to Measure	
					Spectrum in Aviation	Non-Contact	Force (Science: B,C)	
					(Science A,D)	Forces in Flight		
						(Science A,D)		
Differentiation	Capstone	Capstone	Capstone	Capstone	Capstone Connections	Capstone	Capstone	Culminating Capstone
For Tiered	Connections	Connections	Connections	Connections		Connections	Connections	Product/Presentation
Learners					Discovery Education			'
	Discovery Education	Discovery Education	Discovery Education	Discovery Education	Science Techbook	Discovery	Discovery Education	Choice of Aviation
	Science Techbook	Science Techbook	Science Techbook	Science Techbook		Education Science	Science Techbook	Museum Product
					NGSS Case Studies for	Techbook		
	Discovery Education:	NGSS Case Studies	NGSS Case Studies	Discovery	Differentiated Learners		Discovery Education:	
	Boeing Future U	for Differentiated	for Differentiated	Education: Boeing		NGSS Case Studies	Boeing Future U	
	Š	Learners	Learners	Future U	NGSS: All Standards, All	for Differentiated		
	NGSS Case Studies for				Students	Learners	NGSS Case Studies	
	Differentiated	NGSS: All Standards,	NGSS: All Standards,	NGSS Case Studies			for Differentiated	
	Learners	All Students	All Students	for Differentiated	Extensions - Enrichment		Learners	
				Learners	Tasks/Projects			

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	NGSS: All Standards,	Extensions -	Extensions -	NGSS: All		NGSS: All	NGSS: All Standards,	
	All Students	Enrichment	Enrichment	Standards, All		Standards, All	All Students	
		Tasks/Projects	Tasks/Projects	Students		Students		
	Extensions -			Extensions -			Extensions -	
	Enrichment			Enrichment		Extensions -	Enrichment	
	Tasks/Projects			Tasks/Projects		Enrichment	Tasks/Projects	
	, ,					Tasks/Projects	, ,	
Capstone	Capstone Kickoff	Capstone	Capstone Idea	Capstone	Capstone Action Plan	Capstone Action	Capstone Product	Culminating Capstone
Elements	-Introduction to	Brainstorming & Idea	Submission	Experience: Delta	Proposal (Sections A-D)	Plan Proposal	Work	Product &
	Design Cycle	Selection		Flight Museum		(Sections E-G)		Presentations
	-Introduction to		Capstone Idea		Capstone Action Plan		DE: Boeing Future U:	
	Honors Science 8	Capstone	Feedback	Final Capstone Idea	Feedback	Capstone Action	Boeing 360	Capstone Showcase
	Capstone	Experience: Marietta		Submission		Plan Feedback	Experience: Flight	
		Aviation History &	Aviation Periodic		Electromagnetic		Path/Forces of Flight	
	Capstone	Technology Center	Table	Capstone Research	Spectrum in Aviation	Capstone Product	Experience	
	Brainstorming					Work		
		Lab/SIM: Exploring		DE: Boeing Future				
	MYP Aviation Energy	Thermal Energy		U: Boeing 360		Research:		
	Design Challenge	Transfer Between		Experience:		Investigating the		
		Various Materials		Sustainable		Impact of		
				Aviation		Non-Contact		
		CER: Forms of Heat				Forces in Flight		
		Transfer in Flight						