Science Year 4 grade 9

Subject-group overview

Unit title	Key concept	Related concept(s)	Global context	Statement of inquiry	MYP subject specific objective(s)	ATL skills	Content (topics, knowledge, skills)
Space	Relationships	**Form** **Function**	Scientific and Technical Innovation: Systems, models, methods; products, processes and solutions	Our relationship with the universe requires investigating the form and function of space in order to discover solutions to human sustainability.	A -ii. iii. B-ii. C-ii. D-i. ii. Iv.	Research: Information literacy *collect and analyse data to identify solutions and make informed decisions Thinking: Critical thinking skills *draw reasonable conclusions and generalizations. Thinking: Creative thinking *apply existing knowledge to generate new ideas, products or processes	LC 1 I can describe the evidence provided by various technologies and tools used to study space. I can define the Big Bang Theory. I can explain how red shift is related to the motion of distant galaxies. I can explain how waves are arranged on the electromagnetic spectrum. I can identify what fuels the Sun and all stars in the universe. I can describe how energy from the Sun reaches the Earth. I can describe how light spectra data supports the Big Bang Theory. I can describe how the existence of cosmic microwave background radiation supports the Big Bang Theory. I can describe how elements up to iron on the periodic table were formed in the early universe and in stars. I can describe how scientists estimate the age of the sun and its lifespan.

							I can explain the relationship between a star's mass, its stage of development and the types of elements it produces.
							I can explain how a star's brightness is related to its mass and its distance from Earth.
							I can explain how parallax is measured. (Advanced Academics)
							I can describe how Newton's Law of Gravity influences orbital motions (including planets, moons and human-made objects).
							I can use a spectroscope to observe light spectra from different sources.
							I CAN calculate distances between objects using parallax. (Advanced Academics)
							I can use Kepler's laws of planetary motion to describe and predict the motion of orbiting objects.
							I can apply Newton's Law of Gravity to quantify how the gravitational force between two objects is affected by their masses and distance. (Advanced Academics)
							I can develop an explanation supporting the validity of the Big Bang theory based on red shift of light from galaxies, cosmic background radiation data, and the observed composition of matter of the material in the universe.
							I can communicate scientific ideas about the way stars, over their life cycle, produce elements.
							I can develop a model based on evidence to illustrate the lifespan of the sun and the role of nuclear fusion in the sun's core.

	Relationships	**Interaction** Environment	Globalization and sustainability: Urban planning, strategy and infrastructure	Infrastructure can foster relationships between organisms that encourages environmental sustainability.	A -ii. iii. B- iv. C: ii. Iv.v. D: i. ii.	Thinking, creative thinking skills *apply existing knowledge to generate new ideas, products or processes * consider multiple alternatives, including those that may me unlikely or impossible. research, information literacy skills *collect and analyse data to identify solutions and make informed decisions * process data and report results	LC 1 I CAN identify factors that impact biodiversity. (K) (HS-LS4-5, HS-LS4-6) I CAN explain how changes to one or more Earth systems can affect the biosphere. (HS-ESS2-2, HS-ESS2-7) I CAN defend the idea that sustaining biodiversity is essential for life on Earth. (HS-LS2-7) (R) I CAN explain how a change in environmental conditions can affect populations or entire species. (HS-LS4-5) (K) I CAN explain how human activities may affect Earth systems, processes and feedback mechanisms. (HS-ESS2-2) I CAN use empirical evidence to evaluate claims regarding factors that have influenced changes in Earth's biosphere over its history. (HS-ESS2-7) I CAN model the interactions between coral reef ecosystems and the geosphere. (secondary to HS-ESS2-2 and HS-LS2-7) I CAN design and evaluate a solution that reduces the effect of human activities on the environment and biodiversity. (HS-LS2-7, HS-LS-4-6) (P) I CAN design and evaluate a solution that reduces the effect of human activities on the environment and biodiversity. (HS-LS2-7, HS-LS-4-6) (P)
Earth's Crust							
Climate change	Relationships	models Environment	Globalization and Sustainability Urban planning,	Relationships between humans and the environment in	A -ii. Iii iii. B- i. ii. Iii. iv. C: i. ii. Iii.	Thinking IX. Creative-thinking skills Apply existing knowledge to	LC 1: I CAN describe trends in Earth's climate throughout Earth's history.o I CAN identify energy inputs and outputs to Earth's systems and how they relate to climate change.o I CAN

| | | | strategy and infrastructure | relation to urban planning are best explained by creating a model to reduce CO2 emissions.. | D: i. ii | generate new ideas, products or processes

Research VI. Information literacy skills

Collect and analyse data to identify solutions and make informed decisions | describe how the shape of the Earth's orbit around the sun alters the sunlight radiating upon the Earth.o I CAN identify factors that impact biodiversity.o I CAN explain how evolution of photosynthetic organisms lead to changes in other Earth spheres.o I CAN explain how a change in environmental conditions can affect populations or entire species.LC 2o I CAN describe how carbon is cycled among Earth's spheres.o I CAN describe how plants and other organisms capture carbon dioxide and release oxygen.o I CAN identify how human activity has contributed to changes in atmospheric carbon dioxide concentration.LC 3o I CAN identify current climate trends.o I CAN describe and explain causes of current climate data.o I CAN -explain how humans depend on the environment.o I CAN describe whether a predicted effect on an Earth system is reversible or irreversible.LC 4o I CAN identify existing and developing technological solutions to climate change.
  Reasoning Targets What I can do with what I know, LC 1o I CAN justify how geoscience data shows that global and regional climates have changed on a variety of timescales. o I CAN justify how the electromagnetic radiation from the sun is the foundation for Earth's global climate systems.o I CAN justify how changes in the shape of Earth's orbit around the sun and the tilt of the planet's axis of rotation cause changes to Earth's systems and climate.LC 2o I CAN analyze how gradual changes to |

							atmospheric carbon dioxide concentration over time have impacted Earth's spheres.o I CAN justify the importance of carbon to Earth's spheres and on Earth's past, present, and future climate.LC 3o I CAN analyze how human activity has caused changes in the atmosphere and the resulting impacts of these changes on Earth's other spheres. o I CAN interpret geoscience data to make conclusions about climate change and Earth's spheres.o I CAN evaluate the uncertainty in the prediction from a model of climate change.o I CAN identify the factors that affect the rate of chemical reactions.o I CAN use empirical evidence to evaluate claims regarding factors that have influenced changes in Earth's biosphere over its history.o I CAN explain how increasing temperature affects ocean acidification.o LC 4o I CAN analyze how humans are planning and preparing for global, regional, and local climate change and its impacts.o I CAN explain how a technological solution was engineered to reduce the impact of human activity on the environment.o I CAN evaluate the associated constraints- including cost, safety, reliability, and aesthetics- and consider social, cultural, and environmental impacts, of a technological solution.
Hydrology	Systems	Consequences Balance	Orientation in time and space Natural and human landscapes and resources	Analyzing human consequences on the natural and human landscapes will	A i. B i. iii. C i. iii. iv. V. D iii. iv.	Research information literacy *Collect and analyze data to identify solutions	**Next Generation Science Standards**: HS-ESS2-2 ESS2.A: Earth Materials and Systems ⬜ Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease

				help us to understand the balance and impact of humans on the systems of local waterways.		and make informed decisions *Process data and report results Thinking- Critical thinking *Draw reasonable conclusions and generalizations Thinking-creative thinking *Apply existing knowledge to generate new ideas, products, and processes	the original changes. ESS2.D: Weather and Climate ☐ The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's reradiation into space HS-ESS2-5 ESS2.C: The Roles of Water in Earth's Surface Processes ☐ The abundance of liquid water on Earth's surface and its unique combination of physical and chemical properties are central to the planet's dynamics. These properties include water's exceptional capacity to absorb, store, and release large amounts of energy, transmit sunlight, expand upon freezing, dissolve and transport materials, and lower the viscosities and melting points of rocks. Crosscutting HS-ESS3-1 ESS3.A: Natural Resources ☐ Resource availability has guided the development of human society. ESS3.B: Natural Hazards ☐ Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. HS-ESS3-3 ESS3.C: Human Impacts on Earth Systems ☐ The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources HS-ESS3-4	

| | | | | | | | ESS3.C: Human Impacts on Earth Systems ☐ Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. ETS1.B: Developing Possible Solutions ☐ When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (secondary)

HS-LS2-6
LS2.C: Ecosystem Dynamics, Functioning, and Resilience ☐ A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability.

HS-LS2-7
LS2.C: Ecosystem Dynamics, Functioning, and Resilience ☐ Moreover, anthropogenic changes (induced by human activity) in the environment — including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change — can disrupt an ecosystem and threaten the survival of some species. LS4.D: Biodiversity and Humans ☐ Biodiversity is increased by the |

							formation of new species (speciation) and decreased by the loss of species (extinction). (secondary) ☐ Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary) (Note: This Disciplinary Core Idea is also addressed by HSLS4-6.) ETS1.B: Developing Possible Solutions ☐ When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts. (secondary

*School can add columns to this template should they wish.