Pennsylvania Science Grade 5 Performance Level Descriptors

Basic	Proficient	Advanced
A student performing at the **Basic Level** demonstrates partial command of the knowledge, skills, and practices defined in the Pennsylvania Academic Standards for the tested grade(s). This level of performance is considered marginal, indicating that the student is approaching but not yet meeting expectations and may require targeted academic support, either occasional or ongoing, for the student to participate in and keep up with grade-level instruction in the next school year.	A student performing at the **Proficient Level** demonstrates adequate command of the knowledge, skills, and practices defined in the Pennsylvania Academic Standards for the tested grade(s) and meets expectations. This level of performance is considered satisfactory, indicating that the student is academically prepared to participate in and keep up with grade-level instruction in the next school year when provided with Tier 1 instruction.	A student performing at the **Advanced Level** demonstrates thorough command of the knowledge, skills, and practices defined in the Pennsylvania Academic Standards for the tested grade(s) and exceeds expectations. This level of performance is considered superior, indicating that the student is academically prepared for grade level instruction in the next school year, including challenging content.
A student at this level is able to do the following:	**A student at this level is able to do the following:**	**A student at this level is able to do the following:**
• given two life cycles, describe the parts that they have in common.	• develop a model to describe that organisms (e.g., flowering plants) have life cycles with common stages (i.e., birth, growth, reproduction, and death).	• analyze patterns in two life-cycle models to describe unique and common parts of the life cycles.
• given a specific ecosystem, identify the behavior required for an animal to survive based on the claim provided.	• given a specific organism or organisms (e.g., wolf, butterfly, geese), develop an argument that shows animals perform specific behaviors to survive like hunting (alone or in packs), flying in a V-formation, migrating, mating calls and behaviors, defense and escape tactics.	• given a specific ecosystem, create an argument that shows the relationship between an animal and a specific behavior to survive.
• given a picture of plants or animals, identify the traits that come from their parents.	• given a picture of plants or animals (e.g., adult dogs and puppies), interpret data to explain that the traits inherited (e.g., fur color, eye color) come from their parents and may be different than their siblings.	• given a picture of plants or animals, analyze the traits that are possible to be inherited, and which traits are different from their siblings.
• recognize that traits can be influenced by the environment.	• use one source of evidence to support the explanation that traits can be influenced by the environment.	• use multiple sources of evidence to support the explanation that traits can be influenced by the environment.
• given a map of a cross-section of rock layers and fossils, identify the environment at the time the fossilized organism lived.	• given a map of a cross-section of rock layers and fossils, analyze the map and describe the environment at the time the fossilized organism lived (e.g., trilobite found at different rock layers).	• given a map of a cross-section of rock layers and fossils, interpret then predict the environment at the time the fossilized organism lived.
• recognize that variations in characteristics among individuals of the same species may support survival.	• use evidence from one source to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages related to survival.	• use evidence from multiple sources to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages related to survival, finding mates, and reproducing.
• given a description of a habitat, identify the type of plant that will grow there.	• given evidence (e.g., a chart including things such as soil type, elevations, temperature, and trees growing in the area), explain why a particular tree grows well in one area and not the other.	• given the environmental factors of an area, make a claim of why some organisms can live in a particular environment while others cannot.
• given a scenario with an environmental problem and solution, identify how the plants and animals may change.	• given a scenario with an environmental problem and a solution, make a claim based on evidence as to the effectiveness of the solution.	• given a scenario with an environmental problem and solution, predict how other organisms will be affected.
• given a diagram showing the macroscopic structures of a plant or animal, identify the function of one part of the structure that helps the animal survive, grow, behave, or reproduce.	• given a diagram showing the macroscopic structures of a plant or animal, explain the structure and function and describe how they help the organism survive, grow, behave, or reproduce.	• given two diagrams (plant and animal), construct an argument that compares the macroscopic structures and functions to support their survival, growth, behavior, and reproduction.

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Basic	Proficient	Advanced
• make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.	• make a claim supported by evidence about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.	• refine an existing claim supported by new evidence about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
• given a model showing how a plant grows, identify what a plant gets from water and air to support their growth.	• given two examples of plants growing (with and without soil), observe and record data of plant growth to demonstrate that plants get the materials they need mostly from air and water, not from soil. They will use their observations and data to support their argument.	• given a model, explain how a plant gets the materials it needs from water and air and explain that soil is not a necessary component of the materials needed.
• given a model of a specific set of organisms, recognize how matter moves within that environment.	• given a limited set of organisms, develop a model (e.g., food web with a decomposer, carbon cycle) to describe the movement of matter between those organisms.	• develop a model (e.g., diagram with labels) of a set of organisms (including plants, animals, and decomposers) and explain the movement of matter within that environment.
• given a scenario, identify whether a specific organism (including humans) can cause a positive or negative impact in their local environment (e.g., farmers increasing or minimizing runoff from farms into local streams, change in population of pollinators such as bees).	• given a scenario that contains a supplied data set, cite evidence to support the claim that an organism (including humans) is impacting the environment and/or the environment is impacting the organism.	• given a scenario, create a graphical display, and interpret to reveal the effects (positive and negative) of how organisms (including humans) impact their environment.
• given a scenario regarding Pennsylvania land use practices that pollute waterways (e.g., agriculture, urbanization, sprawl, transportation, waste, energy, mining), identify impacts of technologies on the land, vegetation, water or air.	• given a scenario of farming practices, develop a plan to minimize a negative farming practice that pollutes waterways.	• given a scenario of farming practices, students will develop optional farming practices to minimize the pollution of waterways.
• given data (e.g., chart, graph, table) of a local environmental impact (e.g., water usage, wastewater), identify how an individual's behavior impacts the local community.	• given data related to a local environmental impact (e.g., water usage, wastewater), display data (e.g., chart, graph, table) using digital and analog tools (e.g., computers, calculators, timers) and describe multiple ways that an individual's behavior impacts the local community.	• collect data (e.g., through research, surveys) and display data (e.g., chart, graph, table) using digital and analog tools (e.g., computers, calculators, timers) about a local environmental impact (e.g., water usage, wastewater) and analyze how an individual's behavior impacts the local community.
• use a model to identify a human activity (e.g., acid mine drainage from coal mining, clear-cutting of forests, land development increasing impervious surfaces) that led to a local environmental issue (e.g., a decrease in water quality).	• create a cause-and-effect model of human activities that lead to a local environmental issue (e.g., decrease in water quality).	• create a systems model to show how specific human systems (e.g. land or economic development) can impact a connected local and global environmental issue (e.g., quality, food production, survival of local organisms, transportation, manufacturing).
• given a description of a local environmental issue, construct an argument using claim, evidence, and reasoning to support whether action is needed or not to solve the issue.	• given data regarding a local environmental issue, analyze and synthesize data related to that issue, then use claim evidence reasoning process to determine the viability of possible solutions that are needed or not to solve the issue (e.g. reduce, reuse, recycle, trash cleanups, conserve food, energy and water).	• given a local environmental issue, identify data sources, personally collect and compile data to support their claim, and analyze and synthesize data related to that issue, then use claim evidence reasoning process to determine the viability of possible solutions (e.g. reduce, reuse, recycle, trash cleanups, conserve food, energy and water).
• connect human-environment relationships with positive and negative environmental impacts (e.g., strip mining provides raw materials for manufacturing but causes a loss of biodiversity).	• given a human-environment relationship (practices such as urbanization, sprawl, transportation, heat, agriculture, waste, energy, recreation, or mining), analyze data to summarize the positive and negative effects of that relationship on an environmental system.	• identify a human-environment relationship and evaluate data to summarize the positive and negative effects of that relationship on various environmental systems.

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Basic	Proficient	Advanced
• given a scenario of the overuse of a specific natural resource and development of technology related to that resource over time (e.g., water, land ownership, natural gas fracking, oil drilling, availability of locally produced foods), students will identify the potential benefits and consequences of resources overuse can have on a society from one perspective.	• given usage data on a specific natural resource or technology (e.g., water, land ownership, natural gas fracking, oil drilling, availability of locally produced foods), construct an argument about the benefits and consequences of its use from at least two perspectives.	• given usage data on a specific natural resource or technology (e.g., water, land ownership, natural gas fracking, oil drilling, availability of locally produced foods), explain how differing perspectives over its use has or can result in conflict among societies over priorities or competition for finite resources, proposing a solution to resolve the conflict.
• given a description/visual of an object with a predictable motion (e.g., child on a swing, spinning top in a bowl, swinging pendulum, bouncing ball), identify the future movement of that object.	• given a description/visual of an object with a predictable motion (child on a swing, spinning top in a bowl, swinging pendulum, bouncing ball), predict the future movement of that object.	• given a description/data chart (with measurements) of an object with a predictable motion (child on a swing, spinning top in a bowl, swinging pendulum, bouncing ball), predict the future measurement (movement) of that object.
• given a scenario/visual with balanced forces applied on an object, identify the effect of unbalanced forces during the process of moving that object.	• given a scenario/visual with balanced forces on an object, plan an investigation to show evidence of the effect of unbalanced forces during the process of moving that object.	• given a scenario/visual with balanced forces on an object, predict the motion of the object when the force changes.
• given a specific example (magnet holding papers to cabinet, tissue paper moving from electric charge), identify questions that show the relationship between the two objects that are not in contact.	• given a specific example (magnet holding papers to cabinet, tissue paper moving from electric charge), develop questions that show the relationship between the two objects that are not in contact.	• given a specific scenario, predict what might happen between two objects (one of them a magnet or electrically charged) that are not in contact.
• identify a problem that can be solved using magnets.	• describe a problem that can be solved using magnets.	• evaluate a problem that can be solved using magnets.
• given a scenario with marbles rolling down different sized ramps, identify why two identical objects that have different rates of speed will have different energy.	• given evidence and a scenario, explain why two identical objects with different rates of speed will have different energy.	• given a scenario of a marble rolling down different sized ramps, identify and explain why the marble moves and why identical objects that have different rates of speed will have different energy.
• identify energy being transferred (e.g., diagram of electrical circuit and lightbulb turns on when switch is flipped).	• given a scenario, observe and explain types of energy and energy transfer involved (e.g., when the plate is dropped and when the plate hits the ground, why the plate shattered, sound involved, and any other type(s) of energy present).	• given a scenario with a water wheel creating an electrical current to turn a light on inside a building students will identify energy being transferred into one or more forms and explain what is happening (e.g., types of energy and energy transfer involved noting the related connections).
• given an object collision scenario, identify questions and predicted outcomes.	• given an object collision scenario (e.g., two toy cars, a green one and a yellow one, are pushed across a track toward each other from opposite directions), ask questions and make predictions about the motion of an object after they interact.	• given an object collision scenario, ask questions and make predictions about the motion of an object after they interact.
• identify the basic types of energy conversion from one form to another.	• given a description of a device and its results, propose a refinement (e.g., analyzing a windmill with 3 blades and determining how to make it gain power and be more effective, questioning about adding blades and taking blades away).	• given a description of a device and its results, propose a refinement (e.g., analyzing a windmill with 3 blades and determining how to make it gain power and be more effective, questioning about adding blades and taking blades away).
• given a part of a model, identify the differences between wavelength and amplitude; explain why the size of an object that falls into water can make waves bigger or smaller; and create two different waves using a classroom slinky and explain the differences in amplitude and wavelength.	• given a demonstration of two different waves, explain the pattern of two waves with different amplitude or wavelength and their ability to move objects.	• given a demonstration of different waves, predict an object's motion based on the pattern of the wave.

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Pennsylvania Science Grade 5 Performance Level Descriptors

Basic	Proficient	Advanced
• identify parts of a model showing the reflection of light, including sources of light and reflection.	• identify a model that shows the reflection of light following a path between a light source, the object, and the eye, including identifying sources of light.	• use a model to explain why it is difficult to see indoors with sunglasses.
• given a problem, identify a solution that uses a pattern to transfer information.	• given a problem, design a solution that uses a pattern and describes how the information can be transferred to that pattern (e.g., sound waves, flashes of light) and can be decoded.	• given a problem, design multiple solutions and create patterns to transfer the information.
• given an illustration of syringes connected to a pressure meter, identify which has the highest pressure; given an illustration of a dish of salt water in the sunlight, identify what is solid vs. liquid.	• given an illustration of a syringe connected to a pressure meter, identify why the pressure meter increases when the syringe is pressed; given an illustration of a dish of salt water in the sunlight, explain why salt remains after the water evaporates.	• given an illustration of a syringe connected to a pressure meter, students will explain why the pressure meter increases when the syringe is pressed. given an illustration of a dish of salt water in the sunlight, explain why salt remains after the water evaporates and why the salt is not visible when in water.
• given an illustration, identify properties of elements.	• given an illustration, categorize different elements by their physical and chemical properties.	• compare different elements by their physical and chemical properties.
• given a scenario (e.g., graphics, written description, diagrams) and related data including a lab materials list, identify how to use the given materials to conduct an experiment.	• given a scenario with a lab materials list (e.g., graphics, written description, diagrams), describe how to use the data to conduct an experiment (e.g., heat source, ice, water, food coloring to demonstrate convection).	• given a scenario with a lab materials list (e.g., graphics, written description, diagrams), evaluate and refine how to use the data to conduct an experiment.
• given an illustration of a plant and water (both weights displayed) and then an illustration of the emptied water container in the plant (combined weight displayed), identify that the matter is conserved when combined.	• given an illustration of a plant and water (both weights given) and then an illustration of the emptied water container in the plant (combined weight given), explain that the matter is conserved when combined.	• given an illustration of a plant and water (both weights displayed) and then an illustration of the emptied water container in the plant (combined weight displayed), evaluate that the matter is conserved when combined.
• given a scenario, identify if a new substance has formed from combining two different substances.	• given a scenario, determine if the properties of two substances will change when mixed. (e.g., salt dissolves in water, baking soda and vinegar).	• given a scenario, predict and justify what happens when two or more different substances are mixed together.
• given a simple scenario, identify that the force that causes something to fall is a pulling force, not a pushing force.	• use evidence (e.g., egg, data, diagram, demonstration, description) to show that an object near Earth's surface is drawn "down" to the center of the spherical planet due to its gravitational force.	• gather evidence to support the argument that various objects, regardless of their weight, fall toward Earth due to Earth's gravitational force.
• given a food web, use a model to identify and show the flow of energy originating from the Sun and flowing to plants.	• given a list of specific organisms, draw the arrows on a model (e.g., food web) to show the direction of energy flow between organisms.	• given a list of specific organisms, evaluate and revise a model to show how energy flows through a food chain.
• use illustrations to identify average temperature, precipitation, and wind direction among different locations in Pennsylvania during the summer months.	• use tables and graphs to compare average temperature, precipitation, and wind direction between different locations in Pennsylvania during the summer months.	• use tables and graphs to compare average temperature, precipitation, and wind direction among different locations in Pennsylvania during the summer months and use topographical maps to explain reasons for differences.
• given a climate and a weather map, identify the climates in different regions of the world; given a weather map, describe how typical weather conditions vary from region to region in the world.	• compare the climates and typical weather conditions in different regions of the world.	• using precipitation and temperature data, compare the climates and weather conditions between different regions of the world.

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Pennsylvania Science Grade 5 Performance Level Descriptors

Basic	Proficient	Advanced
• identify the structure that protects a town next to a river from flooding; identify the structure that protects a building from a lightning strike during a thunderstorm.	• demonstrate how to protect a town next to a river from flooding and how to protect a building from a lightning strike during a thunderstorm.	• given a flood plain map, demonstrate how to protect a town next to a river from flooding and given an architectural design of a building, demonstrate how to protect the building from a lightning strike during a thunderstorm.
• given a schematic of rock layers, identify the type of environment that existed during the identified time period based on the fossils found in that layer.	• given a schematic of rock layers, explain the type of environment that existed during the identified time period based on the fossils found in that layer.	• given a schematic of rock layers, formulate a theory to explain the type of environment that existed during the identified time period based on the fossils found in that layer.
• given a scenario, identify which image shows the effect of weathering described (e.g., erosion).	• given a scenario, describe the effects of water and ice on roadways. (e.g., potholes).	• given a data table, make inferences to complete the data table showing the changes in the size of rocks over time based on increased rainfall.
• given a map and scenario of previous earthquake data, identify the pattern that earthquakes often occur along the boundary between continents and ocean.	• given a map and data of previous earthquakes, describe the pattern of where earthquakes often occur (i.e., along the boundary between continents and ocean).	• given a map and scenario of previous earthquake data, students will examine the data, form a claim, and provide reasoning for the pattern that earthquakes often occur along the boundary between continents and ocean.
• given a scenario which shows that energy and fuels come from natural resources, identify how their use affects the environment.	• given a scenario, describe how energy and fuels come from natural resources and explain how their use affects the environment.	• given a scenario, combine information about energy and fuels, explain how they come from natural resources, describe them as renewable or nonrenewable, and explain both positive and negative impacts of their use on the environment.
• given a set of building images, identify which building is more likely to survive a flood.	• given a list of available building material resources, describe how to create an earthquake-resistant building.	• given a scenario, students will infer the impact of a natural disaster on the environment and humans.
• given data that show that the closer a star is to Earth, the brighter the star appears, identify that the star's distance from Earth affects its apparent brightness.	• given a star data chart, use tables and graphs to support a claim that the Sun appears larger and brighter than other stars because it is closer to Earth. This includes identifying the distances of different stars (including the Sun) from Earth and describing the apparent brightness of various stars.	• gather evidence to construct an argument as to why the Sun appears larger and brighter than other stars.
• identify that the size of a shadow changes, that the appearance of the moon changes, and use data to identify patterns in the size of shadows and to identify patterns in the phases of the moon.	• given a data set, identify the correct data representation about the length and direction of shadows, length of day and night, and seasonal appearance of stars in a graph.	• use data to visualize and predict daily changes in shadows and seasonal appearance of stars.
• given a scenario, identify parts of the water cycle.	• develop a model that describes the critical elements of the geosphere, biosphere, hydrosphere, and atmosphere and describes how they interact.	• given a model, identify and explain the result of the interaction of two Earth systems.
• use data to show that the ocean contains most of Earth’s water.	• use a graphical representation to explain the various sources of fresh water on Earth and the amounts and percentages of fresh water and overall water on Earth.	• use data to quantify and visualize (graph) the amount of salt water and fresh water on Earth.
• identify how people are preventing deforestation, limiting air pollution, and reducing water pollution.	• explain how people are preventing deforestation, limiting air pollution, and reducing water pollution.	• given evidence of deforestation, air pollution, and water pollution, explain how to repair and prevent further damage.

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Basic	Proficient	Advanced
• given a scenario about a local environmental issue, identify a solution to the problem.	• given a scenario about a local environmental issue (e.g., invasive species), explain a solution to the problem based on certain justifications.	• given a scenario about a local environmental issue, evaluate/revise a solution to the problem.
• given common symbols, numbers and words related to technological products and systems, identify the meaning of each (e.g., hazard symbol, recycling logo, input/process/output on a systems model).	• be able to effectively use common symbols, numbers, and words related to technological products and systems on their drawings, designs, and in their communications (e.g., hazard symbols, colors/shapes for signage, recycling logo, numbers and their associated units, directional parts with a flow chart, timeline or appropriate sequence of methods or phenomena, input/process/output labels on a system model).	• apply and communicate technological systems symbols, numbers, and words to novel design solutions to communicate their intended effective communication of the design.
• recognize that there are positive and negative tradeoffs within a system.	• given a product or simple system and list of trade-offs, be able to identify which trade-off would be positive and which trade-off would be negative.	• given a specific system, analyze the tradeoffs to adjust the system and justify that choice, or predict possible positive and negative outcomes resulting from that choice.
• identify a checklist that is required to achieve a solution for a technological task.	• given directions to complete a technological task, conduct an investigation and identify the appropriate order and use them to successfully complete a task.	• given a technological task, write directions and follow them to successfully complete a task.
• identify from a diagram what parts of the system are and identify what is broken, missing or not working properly (picture of a bike with missing chain).	• identify from a diagram what parts of the system are broken, missing or not working properly, and select a solution from a list.	• given a diagram of a product or system, propose and justify a solution to address the problem.
• given a list of tools/machines and a task, identify which tool will assist with the correlating task.	• given a scenario/visual about a tool/machine being used by a human to complete a task, explain how the tool/machine extends the human's capability to complete the task.	• given a scenario where a human does not have the capabilities to complete the task, design a tool/machine to solve the problem and construct a claim (provide data) to support how that tool/machine extended human capabilities during the task.
• given a list of criteria and constraints for a product or system, describe the steps involved from research to completion in designing and making that product or system.	• given a list of criteria and constraints for a product or system, describe the steps and relevant considerations involved from research to completion in designing, prototyping, and testing that functional product or system.	• given a list of criteria and constraints for a product or system, describe the steps and relevant considerations involved from research to completion in designing, prototyping, and iteratively testing and optimizing the performance of that functional product or system.
• given a list of materials, match the properties to that material.	• given a list of materials (e.g., wood, foam, wool), describe the properties of each material to determine whether it is suitable for a given purpose (e.g., insulation, construction).	• given a design challenge scenario, identify and justify their selection or application of materials based on their properties.
• given a list of resources needed to meet a specific technical job, define those resources as they relate to the problem.	• given a design challenge scenario to meet a human need or want, identify the resources (e.g., people, materials, money, tools) needed to design a solution to the challenge, and identify the resources (e.g., people, materials, tools, money) needed to meet a specific technical job.	• identify a challenge to address a human need or want and be able to identify and justify the resources (e.g., people, materials, money, tools) needed to design a solution to that challenge and evaluate a scenario and propose, with justification, what resources (e.g., people, materials, tools, money) are needed to accomplish a technical job.
• design a product (real or conceptual) that meets a personal need or want (e.g., a game, toy, desk organizer, automatic door opener) utilizing the design process.	• given a scenario, design a product that meets an identified need or want that improves someone's life (e.g., a game, toy, desk organizer, automatic door opener).	• given a scenario, design a product that meets an identified need or want (e.g., a game, toy, desk organizer, automatic door opener) and evaluate its success.

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• given a system with missing components, identify the outcome(s) of the system resulting from the missing components (e.g., flat tire on a bike).	• predict effects to a system when a component is missing and identify results to the system's performance. (e.g., flat tire on a bike, computer with interrupted power, vehicle with flat tire).	• predict how different missing components in a system may result in different performance(s) or outcome(s) to the system (e.g., flat tire on a bike vs. chain off, computer with interrupted power vs computer with no internet connection, vehicle with flat tire vs. vehicle with dead battery).
• given an illustration or explanation of a familiar technical system, identify the larger system to which it contributes (e.g., home water pipes are part of the larger freshwater distribution system in the community; bicycles and cars are part of the larger transportation system in a community to move people and goods).	• given an illustration of a wind turbine, describe how the turbine is part of the whole system needed to create power.	• given an illustration of a wind turbine, examine multiple steps of the system of the process to create power.
• given an engineering design problem, use the engineering design process to build and test their solution.	• given an engineering design problem, use the engineering design process to research and ideate multiple design solutions to the problem, build then test one solution against criteria and constraints, and identify improvements to the design.	• given a scenario, create a project using the engineering design process with limited materials, use trial and error experimenting to improve the design, and evaluate the solution.
• given a set of solutions (maybe their own design), identify the most appropriate one for a design brief (problem statement, criteria, and constraints).	• given a design brief (e.g., problem statement, criteria, and constraints), identify strengths and weaknesses of a design solution (their own or others) to determine if it is sufficient.	• given a design brief, develop a design solution, identify positive/negative tradeoffs, and redesign to optimize the solution.
• when given a simple problem scenario, identify some constraints and criteria for the problem, ask questions about the problem, design a possible solution to the problem, and apply a given test to determine effectiveness.	• given a set of materials and objectives, ask questions and design a device that requires multiple iterations and tests to determine its feasibility (e.g., manufacturing a better, safer vehicle, manufacturing a more efficient way of growing crops).	• given a set of materials, objectives and a specific problem, ask questions and design a device that requires multiple iterations and tests to determine its feasibility.
• given a design scenario, identify the necessary tools and techniques to build their design with the given materials, and demonstrate the safe use of tools, techniques, and materials while following step-by-step procedures.	• given a design scenario, select from multiple possible tools, techniques and materials to create a solution in a safe manner.	• given a design scenario, identify potentially unsafe applications of tools, materials, or techniques and suggest appropriate safe alternatives.
• given various illustrations and a scenario, identify which design would be a potential solution to the problem.	• given a design problem scenario, generate more than one solution to the problem within the stated context, materials, and intended purpose.	• given a design problem scenario, generate two or more original solutions to the problem within the stated context, materials, and intended purpose and articulate in writing the unique features of each design.
• in a design scenario, identify principles and elements of the design process and explain their importance.	• given a design challenge, design, test, and refine a device using the engineering design process.	• given a scenario of an engineering design challenge, use the engineering design process to design, test, and optimize the best possible solution.
• given a list of constraints and a design, identify a met constraint.	• given a list of constraints and a design, describe why the design does or does not meet the constraints.	• given a list of constraints and a failed design, amend the design with a possible solution to meet the constraints.
• given a scenario with multiple technological solutions, identify a solution relating to its ability to improve the human condition. (emphasis on manufacturing and other large-scale solutions).	• given a scenario with multiple technological solutions, critique each solution regarding its ability to improve the human condition.	• given a scenario, design a technological solution, critique the solution regarding its ability to improve the human condition.

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• given a list of tools, identify what that tool was used for.	• given a list of tools (e.g., ax, hoe, spinning wheel), explain how the tools are used, including their purpose and underlying need.	• given a list of purposes for certain tools, create a representation explaining what the tool is and how it was made.
• given a scenario, identify how an absence of technology would change lives.	• given a scenario, explain how new or modern technology has an impact on humans and the larger community (e.g., impact of installing robots in a manufacturing company).	• given a scenario (e.g., absence or failure of technology), evaluate and communicate changes that could occur with technologies and the impacts resulting from those changes.
• given a scenario about a technological system, identify responsible and irresponsible use of resources.	• given a scenario about a technological system, describe ways to monitor and responsibly manage its resources.	• given a scenario about a technological system, predict ways to monitor and responsibly manage its resources while ensuring sustainability and improving efficiency of the system.
• given a set of resources used to create technologies, classify at least one as renewable and at least one as nonrenewable.	• given a set of resources used to create technologies, classify each as renewable or nonrenewable and provide at least one additional example of each.	• given different renewable or nonrenewable resources, describe their uses.
• given a scenario where technology is impacting society (e.g., manufacturing, agriculture, electric car battery), identify a helpful or harmful effect of the technology.	• given a scenario where technology is impacting society (e.g., manufacturing, agriculture, electric car battery), explain the impacts of the technology and identify which are helpful or harmful.	• given a scenario where a technology impacting society has unintended consequences, evaluate evidence about the helpful or harmful impacts and predict ways to mitigate them.
• given a specific task, choose one type of tool and/or technology that can assist in the completion of that task.	• given different types of technologies and tasks, describe/explain which one will best meet the needs of the task.	• given different types of farming machinery and a task scenario, predict which one will be needed for future tasks (e.g., planting, picking, tilling, water irrigation).
• given a list of inventions and human uses, identify which invention is best used for each need (e.g., which of these factors (or situations) spurred the development and advancement of air bags in vehicles?).	• given a technological product or societal system, identify two or more societal needs or wants, based on community values, environmental factors, and/or economics, which influenced the innovation of that system over time. (e.g., trash and recycling system yield pickup schedules, automation of trucks, complex sorting requirements and equipment).	• given a possible future product or societal system, identify and explain an innovative improvement to a system based on community values, environmental factors, and/or economics, to improve human interaction or efficiency of the product or system. (e.g., automation factors that can improve single stream recycling).
• identify technologies that have evolved over time and describe what individual or societal needs caused the evolution of those technologies (e.g., phones).	• given a scenario, use evidence to explain how technologies are developed or adapted when an individual or society's needs and/or wants change.	• given a scenario for a need in society and the technology used for that need or want, design a new product and explain the various aspects of the product that meet societal needs.
• given a scenario, identify a relationship between technology and engineering and another content area.	• given a scenario, explain the benefits of and how technology, engineering and other content areas work together to solve problems.	• given a scenario, evaluate and support possible interdependencies or synergies between technology, engineering and other content areas to solve present or possible future problems.
• given examples of a complex machine or system, identify simple technologies that make it up.	• when presented with a task and set of simple technologies, combine them into a series to create a complex machine or system to complete a task.	• when presented with a task, select simple technologies to create a more complex machine or system to complete the given task and explain.
• given a problem or issue, propose a simple solution that identifies the tools, materials, and/or skills needed but that does not necessarily address how these components are utilized safely and appropriately to address the problem.	• given a problem or issue, propose an appropriate solution that identifies the tools, materials, and skills needed and addresses how to safely use such tools, materials, and skills to achieve the desired outcome.	• given a problem or issue, propose two or more solutions that identify and safely utilize the tools, materials, and skills necessary to address the issue and will provide an argument advocating for their preferred solution based on the tools, materials, and skills selected.

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Pennsylvania Science Grade 5 Performance Level Descriptors

Basic	Proficient	Advanced
• identify (from a list of given suggestions) specific economic, political, and cultural forces that have shaped technological developments throughout history (e.g., How does a pandemic affect the development of new technologies? How are rural communities' needs/solutions different from urban ones?).	• given a technological innovation or invention (e.g., automobile, cell phone, airplane), describe several economic, political, and cultural forces that affected the development of the technology.	• given a technological problem, analyze and explain why the relationships between political, cultural interests and/or economic (e.g., financial) resources can positively or negatively influence possible solutions.
• given two items, one that is human-made and one that is found in nature, explain either their similarities or differences in either how they are produced or how they are used.	• given two items, one that is human-made and one that is found in nature, explain their similarities and differences in both how they are produced.	• given a list of items, identify whether they are human-made or found in nature, then categorize them into groups that are similar in how they are produced or how they are used and justify the choices by explaining.
• identify a technological product or system that demonstrates a scientific correlation to the natural world reflected in the product design (e.g., form, function, aesthetics, colors).	• identify a technological product and describe the scientific correlation to the natural world reflected in the design (e.g., form, function, aesthetics, colors) which were applied to invention or innovation.	• identify a problem and propose a technological product or solution that incorporates the scientific correlation to the natural world in the design (e.g., form, function, aesthetics, colors) and provide evidence to support the invention or innovation.
• given a list of tasks/roles, categorize them according to each career discipline.	• given a particular technological device, or system and a list of contributing careers, explain how each of the related careers have contributed/collaborated to its development, utilization and maintenance, (e.g., computer, microscope, tractor, pencil sharpener).	• given a particular technological device, or system, explain how each of the related careers have contributed/collaborated to its development, utilization and maintenance.

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