

SCIENCE STANDARD ACTIVITY TEMPLATE

Biology	
List the Standard	HS-B.LS1.1: Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.
Breakdown the most important parts of the standard	Construct, evidence, DNA determine structure of protein, DNA determines function of life
What game will you make?	Crack the Code
What is the goal of the game?	The group that assembles Mr. Potato Head the quickest by properly transcribing DNA codons to RNA codons, translating RNA codons to amino acids with the help of a genetic code chart, and discovering the traits for Mr. Potato Head based on the protein determined from the amino acid chain wins. Also, for students to correctly answer higher order thinking questions surrounding protein synthesis.
How does the game prove the standard?	DNA sequences determine the amino acid sequence and thus, protein structure. To understand that DNA is the ultimate decider for the characteristics that living organisms portray that allow us to function, and that there are multiple steps that occur to achieve this final product.
List all materials needed	Crack the Code Instructions, set of Higher Order Thinking (HOTs) questions, Protein Synthesis Team Card, Smarty Pants Answer Keys, genetic code chart(s), Mr. Potato Head (arms, eyes, ears, feet, mouth), note cards, foam cards, markers, colored pencils, hot glue sticks, glue gun, glue sticks, scissors station sign, markers, color pencils, tape, poster/foam board

SCIENCE STANDARD ACTIVITY TEMPLATE

Biology	
List the Standard	<p>B.LS4.4: Construct an explanation based on evidence for how natural selection leads to adaptation of populations.</p> <p>B.LS4.5: Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.</p>
Breakdown the most important parts of the standard	Create a model that shows how natural selection leads to adaptation
What game will you make?	Darwin's Discoveries
What is the goal of the game?	To retrieve the most food at the end of the game and determine which "beak" is best suited to survive for each biome.
How does the game prove the standard?	Students will start the game blindfolded as the food is arranged in each environment. When time is called to go student will hunt for the food in their environment with the "beak" they are provided. Students are given a set time to retrieve as much food as possible in their environment. The student that retrieves the most food from one's environment in order to survive and reproduce wins.
List all materials needed	Stop watch, tweezers, tongs, chopsticks, toothpick, clothespin, tongue depressors, test tube holder, large binder clips, small binder clips, slotted spoon, regular plastic spoons, white foam plates, refrigerator magnets, baskets, straw/Pipette/dropper, cups, calculators/phone, zip lock bags, food coloring, rubber bands, gummy worms, marshmallows, mung beans, marbles, rice, bird seed, coins, Tic-Tacs, Smarties, Styrofoam peanuts, live worms and minnows, drop cloth, aluminum pans, digital scale, note cards

SCIENCE STANDARD ACTIVITY TEMPLATE

Biology	
List the Standard	B.LS1.3: Plan and conduct an investigation to provide evidence of the importance of maintaining homeostasis in living organisms.
Breakdown the most important parts of the standard	Plan and conduct investigation, provide evidence of homeostasis
What game will you make?	Agility course lab race
What is the goal of the game?	When the whistle blows, two students will race through an inflatable, next complete hopscotch, on to a sack race, weave a soccer ball through cones, and kick it into the net. The first to complete the race wins.
How does the game prove the standard?	Students will record their number of breaths in 15 seconds before the game starts and the number of breaths after the race. Students will determine the effects of respiration when an activity increases, and how the body compensates to keep up with external & internal pressures.
List all materials needed	Inflatable obstacle course, whistles/bull horn, soccer ball, heavy duty cones, soccer ball net with target, sidewalk chalk (hopscotch), sack race, clipboard

SCIENCE STANDARD ACTIVITY TEMPLATE

Biology	
List the Standard	BS.LS1.2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
Breakdown the most important parts of the standard	Hierarchical organization in systems with specific functions
What game will you make?	Giant body systems operation
What is the goal of the game?	Given a scenario, students will use their knowledge of body systems in order to remove the correct organ from patient X. The one to remove the most wins.
How does the game prove the standard?	This game is a large size operation game. Students will answer questions based on hierarchical organization. If students guess correctly, they will have the opportunity to retrieve the organ associated with the corresponding questions. The student that is able to retrieve the most parts, without setting off the buzzard, wins.
List all materials needed	Metal conductive tongs, Diskpro red LED flashing light, GTSE aluminum foil tape 4 inches x 55 Yards (164 ft), multi-purpose silver adhesive metal tape for repairs, ducts, insulation, 1 large roll conductive tape, large containers, yellow paint, severe weather-treated wood, black steel corner brace, BNTECHGO 18-gauge silicone wire spool red and black each 25ft, 2 separate wires, flexible 18 AWG stranded copper wire, rechargeable solar battery, staple gun, foam board, wood glue, super glue

SCIENCE STANDARD ACTIVITY TEMPLATE

Biology	
List the Standard	B.LS4.2: Construct an explanation based on evidence that biological diversity is influenced by (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
Breakdown the most important parts of the standard	Use evidence to determine biological diversity being influence by the potential of organisms that are better able to survive and reproduce in the environment
What game will you make?	Evolving leaping frogs
What is the goal of the game?	Students will partner up. Partners will compete against each other at a distance. Each student will toss their frog towards one another's boards, trying to make the frogs land into the hole. If the frog makes it into the hole on the other side, it will survive. Students will calculate the percentage of each frog species(color) before and after each trial. The student with the most frogs surviving wins.
How does the game prove the standard?	Students will determine the chances of their organism to survive and reproduce. Students will calculate the percentage of each frog species (color) before and after each trial to determine which species is most likely to survive and reproduce.
List all materials needed	Cornhole boards, green/blue tablecloth, frog bean bags

SCIENCE STANDARD ACTIVITY TEMPLATE

Biology	
List the Standard	HS.LS1.3: Plan and conduct an investigation to provide evidence of the importance of maintaining homeostasis in living organisms.
Breakdown the most important parts of the standard	Plan, investigate, and provide evidence of homeostasis
What game will you make?	From Rest to Racing: How Your Body Changes
What is the goal of the game?	PBS will do an activity dealing with HOSA and the body systems unit in Biology. Part 1, they will quickly investigate and record baseline data before and after the event. Part Two will be the effects of My Agility Challenge on Heart rate, oxygen saturation, respirations and other body systems.
How does the game prove the standard?	Students will learn the body's need to maintain homeostasis when there are changes to internal and external environments.
List all materials needed	Pulse oximeter, thermometer, eye chart, stethoscope, blood pressure measure

SCIENCE STANDARD ACTIVITY TEMPLATE

Chemistry	
List the Standard	CH.PS1.7: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction
Breakdown the most important parts of the standard	Mathematics, support claim, and conservation in a chemical reaction
What game will you make?	Bouncy Ball Chemistry ($2\text{Gl} + 1\text{Ch} \rightarrow 1\text{Gl}_2\text{Ch}$)
What is the goal of the game?	To create a ball that bounces higher than your competition.
How does the game prove the standard?	Matter is neither created nor destroyed in a chemical reaction. It is important to start with the correct number of materials in order to yield the correct product. Balanced chemical equations give you the information needed to determine the appropriate amounts of reactants and products needed to complete a reaction. If you do not use the correct amounts, your product will not turn out correctly. In this case, your ball could be too soft to bounce or too brittle to form a proper ball. The chemical reaction is primarily between the borax and the glue. The borax acts as a “cross-linker” to the polymer molecules in the glue – it creates chains of molecules that stay together when you pick them up. The cornstarch helps bind the molecules together so they hold their shape better
List all materials needed	Borax solution, glue, cornstarch, water, note cards for questions

SCIENCE STANDARD ACTIVITY TEMPLATE

Physical Science

List the Standard	PS.PS3.2: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields. PS.PS3.3 - Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
Breakdown the most important parts of the standard	Create a model to show and explain energy in motion and design device to show how one form of energy converts to another
What game will you make?	To Infinity and Beyond (Balloon Rockets)
What is the goal of the game?	The Path that the Balloon Rockets various lines will provide varying oppositional forces. The student will build and race rockets to travel a fixed distance. The team whose rocket travels the furthest the fastest wins.
How does the game prove the standard?	Two students are each given a balloon to blow into for a fixed time. When time is called, students will attach their balloon on their designated straw that is attached to the string. Force released from the pressure of the balloon will be used to propel the balloons forward.
List all materials needed	Balloon, drink straw, string, yarn, tape (scotch, duct, masking), two objects of the same height that you can tie a string to. We used two chairs, note cards for questions

SCIENCE STANDARD ACTIVITY TEMPLATE

Physical Science

List the Standard	PS.PS2.1: Analyze and interpret data to support the claim of a causal relationship between the net force on an object and its change in motion, as described in Newton’s second law of motion.
Breakdown the most important parts of the standard	Analyze and interpret data to show the relationship between force on object and motion.
What game will you make?	Factors that Impact a Strike
What is the goal of the game?	Students will bowl from a fixed distance to see how factors like pressure and angles, torque affect the probability of getting a strike (knocking over pins). They will develop and make predictions about Physical Science to calculate factors of force, motions, and impact of collision.
How does the game prove the standard?	The students will calculate Force and Motion, and determine Energy Transfer, ie. Students will get the mass of the ball; the speed of the ball traveling down the lane and use that to calculate the force they transferred to knock down the pins.
List all materials needed	Wooden bowling set [10 pins, 2 balls, butcher paper (lane), box (gutter)], velocity gun, note cards for questions, tape, stickers (to mark where pins go)

SCIENCE STANDARD ACTIVITY TEMPLATE

Physical Science

<p>List the Standard</p>	<p>PS.PS3.1: Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.</p> <p>PS.PS3.3: Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.</p>
<p>Breakdown the most important parts of the standard</p>	<p>Create a model & calculate to show the change in energy.</p>
<p>What game will you make?</p>	<p>Barbie Bungee Challenge</p>
<p>What is the goal of the game?</p>	<p>To determine using height and rubber bands, how to have a safe and exciting bungee jump for Barbie. (Students should get as close to the ground without hitting barbie’s head)</p>
<p>How does the game prove the standard?</p>	<p>Students will differentiate between speed, velocity and acceleration. Students will compare and contrast Newton’s three laws. Students will create a bungee cord out made out of rubber bands of whatever size they choose for Barbie to bungee jump off a bridge, or building. Each student should make at least 3 trials and do practice runs before the drops. Then you will take and plot your data and make any adjustments and repeat the after each trial. Students will have their Barbie jump with a one rubber band bungee cord and record how far her head comes to the ground for the jumpsuit. They will then repeat this adding or removing up to 20 rubber bands. Students will plot their data next and draw a trend line. The trend line will be used to predict the number of rubber bands necessary for Barbie to have a safe and exhilarating jump without hitting their head. (Calculation of SLOPE ($y = mx + b$), y=drop height, x=the number of rubber bands, b=height of Barbie).</p>
<p>List all materials needed</p>	<p>Triple beam balance/scales, tape measure/meter sticks (2), measuring wheel, rubber bands (sm, med, lg), Barbie Dolls (female & male), calculator, note cards for questions</p>

SCIENCE STANDARD ACTIVITY TEMPLATE

Physical Science

List the Standard	<p>PS.PS2.1: Analyze and interpret data to support the claim of a causal relationship between the net force on an object and its change in motion, as described in Newton’s second law of motion.</p> <p>PS.PS2.3: Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.</p> <p>PS.PS3.2: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields</p> <p>PS.PS3.4: Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).</p>
Breakdown the most important parts of the standard	<p>2.1 Analyze and interpret data relationship between the net force on an object and its change in motion</p> <p>2.3 explain how to minimize force on object during collision</p> <p>3.2 create a model to show and explain energy in motion</p> <p>3.4 when heat applied = new energy</p>
What game will you make?	To Infinity and Beyond (estes rockets)
What is the goal of the game?	The Path that the Balloon Rockets various lines will provide varying oppositional forces. The student will build and race rockets to travel a fixed distance. The team whose rocket travels the furthest the fastest wins.
How does the game prove the standard?	This satisfies part of Newton's first law that an object in motion will remain in motion unless acted upon by another force. Students will place their rockets up against various forces. Newton’s second law showing energy transfer from the force provided by the launcher to a macroscopic model (the rocket)
List all materials needed	Yarn, string, estes rocket kits, estes launch controller, Exacto knife kit, disposable gloves, spray paint, drop cloth, glue gun, glue sticks

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Physical Science	
List the Standard	PS.PS2.1: Analyze and interpret data to support the claim of a causal relationship between the net force on an object and its change in motion, as described in Newton's second law of motion. PS.PS3.2: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields
Breakdown the most important parts of the standard	Analyze and interpret data relationship between the net force on an object and its change in motion and create a model to show and explain energy in motion
What game will you make?	Force Pairs and Newton's Laws
What is the goal of the game?	Students will bounce the golf balls off objects attempting to get a hole in whole. They must draw a model, calculate the variables, and successfully hit a whole in one given 3 attempts per hole. They will write a prediction about how the change in motion and energy affects the object and outcome.
How does the game prove the standard?	This satisfies part of Newton's first law that an object in motion will remain in motion unless acted upon by another force. Students will place their rockets up against various forces. Newton's second law showing energy transfer from the force provided by the putter to a macroscopic model (the ball)
List all materials needed	Golf putter, golf balls, mini golf holes, hole in 1, clear container with lids to add obstacles

SCIENCE STANDARD ACTIVITY TEMPLATE

Physical Science	
List the Standard	PS.PS2.1: Analyze and interpret data to support the claim of a causal relationship between the net force on an object and its change in motion, as described in Newton’s second law of motion. PS.PS2.2: Use mathematical representations to support the explanation that the total momentum of a system of objects is conserved when there is no net force on the system.
Breakdown the most important parts of the standard	Use a model to show and explain energy in motion
What game will you make?	Can You Calculate the Forces?
What is the goal of the game?	Get the football/baseball into the hole and kick the kickball into the net in order to win.
How does the game prove the standard?	Students will develop and make predictions about physical science to calculate factors of force, motions, and impact of collision. The students running this game will determine the force, motion, and energy transfer. They will be able to test with the velocity gun, and other instruments, and determine which calculations will be the most accurate.
List all materials needed	Football toss, football multipack, kickball, velocity speed gun, baseball with built-in sensor

SCIENCE STANDARD ACTIVITY TEMPLATE

Physical Science

List the Standard	PS.PS3.3: Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
Breakdown the most important parts of the standard	Design device to show how one form of energy converts to another
What game will you make?	Rube Goldberg device
What is the goal of the game?	Students describe how energy is transferred and the different types of energy involved. The students able to use the correct amount of force to hit the lever and cause the reactions to allow the water to dump will win.
How does the game prove the standard?	Energy taken into many forms from the ball to the levers to the dunking of the water.
List all materials needed	Dunk-a-teacher, raffle tickets, poncho, plastic head cover, dolly

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Physical Science

List the Standard	PS.PS2.1: Analyze and interpret data to support the claim of a causal relationship between the net force on an object and its change in motion, as described in Newton’s second law of motion.
Breakdown the most important parts of the standard	Prove how an object does not move when there is no force on it?
What game will you make?	Ring Toss Review
What is the goal of the game?	Students will toss 5 rings. If the student is able to land their ring(s) on a bottle, they win.
How does the game prove the standard?	This satisfies part of Newton's first law that an object in motion will remain in motion (the ring) unless acted upon by another force (the bottle). Newton’s second law, students are applying force to an object (the ring) to cause it to accelerate, and must take into consideration the mass of the ring and the amount of force it will take to complete the toss correctly.
List all materials needed	Plastic carnival rings, bottles with rings, glass soda bottle, rings, soda crate, ring swing

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Physical Science

List the Standard	PS.PS2.1: Analyze and interpret data to support the claim of a causal relationship between the net force on an object and its change in motion, as described in Newton's second law of motion.
Breakdown the most important parts of the standard	Show causal relationship between force on object and object's motion
What game will you make?	Net Force Knockout
What is the goal of the game?	Students partner and go against another set of partners. The ball must be kept up by three hits and then make its way back to the net. The team who drops the ball or doesn't return it to the net on time, loses.
How does the game prove the standard?	Students are using different forces to keep the ball in motion and to cause changes in motion.
List all materials needed	Spikeball game set