INSTITUTE of PLAY

Mission Pack: Dr. Smallz

Can you save a dying patient's life?

6-7
GRADES


SCIENCE

13
WEEKS

Topics include: cells and organelles, cellular processes, human body systems, microbiology

Version 1.0

Three students bounce on the soles of their feet as they surround another student looking through a microscope's lens. "What do you see? What do you see? What do you see?" asks one student, anxiously. "I think I see the letters 'http', then a colon, then something," replies another student. "Is it http, colon, slash, slash? That's the exact thing you put in front of a website!" exclaims the first student. The third student's eyes widen. "Wow," he says softly.

Visit Quest Learning in Action to see more.

About This Curriculum

At Quest schools, our curriculum and instruction is grounded in game-like learning. Game-like learning is a research-based theory of learning that draws from what we know games do best: drop players into inquiry-based complex problem spaces in which challenges are leveled to deliver just-in-time learning. Games also use data-driven feedback to help players understand how they are doing, what they need to work on, and where they need to go next. Lastly, games provide engaging contexts for students to build content knowledge along with 21st century skills, such as systems thinking, design thinking, communication, collaboration, creativity, and innovation.

Game-like learning frames the way we plan units. All learning units are organized into "missions." When a mission is introduced, students are faced with an immediate "need to know" that engages them in solving a mission's complex challenge. Sometimes these missions are organized around narratives; sometimes not. Students are also often given roles to play during missions, such as being detectives, spies, or journalists.

At the beginning, students don't know how to solve the mission's complex challenge; they must solve a series of "quests" that help them build essential knowledge and skills needed to complete the mission challenge. During quests, students use games and other project-based learning experiences to build their understanding of content and practice new skills. At Quest schools, teachers also creatively evaluate student learning through assessments that are technology-based, game-based, and/or have a connection to the real world.

This curriculum resource is designed to give you an idea of how Institute of Play and Quest teachers transform the learning of content and skills into game-like experiences that engage and excite students. Even though Quest teachers actively engage in the role of designer and innovator during curriculum development, it is important to note that Quest teachers use more well-known activities and assessments in addition to game-like experiences. This curriculum resource does not include those types of learning activities and assessments because we know that they can be found in other web-based resources or textbooks. Institute of Play designed this resource to share the unique approaches that Quest students experience and provide you with ideas and materials to bring game-like learning into your classroom.

Curriculum at Quest schools empowers students to become active problem-solvers and innovators in the 21st century. We design opportunities for students to build 21st century skills, such systems thinking, design thinking, and social-emotional skills. As systems thinkers, students identify parts and relationships within systems, discover patterns and feedback loops, and find possible leverage points for systemic change. As designers, students brainstorm, prototype, test, and iterate ideas and solutions to challenges. As community members and citizens, students work on listening, communicating, collaborating, leading, and mediating.

The sections of this resource include:

MISSION SUMMARY

A summary of the narrative of the mission and the challenge(s) posed to students, as well as essential questions and enduring understandings for the content of the mission.

MISSION OVERVIEW

A list of quests in the mission with the length and summary for each one.

FINAL MISSION ASSESSMENT

A description of the final assessment that students complete at the end of the mission.

QUEST-BY-QUEST DETAILS

The collection of quests in the mission with more information about learning goals, game-like learning experiences, and other assessments used in each quest.

APPENDIX

Includes helpful resources, such as:

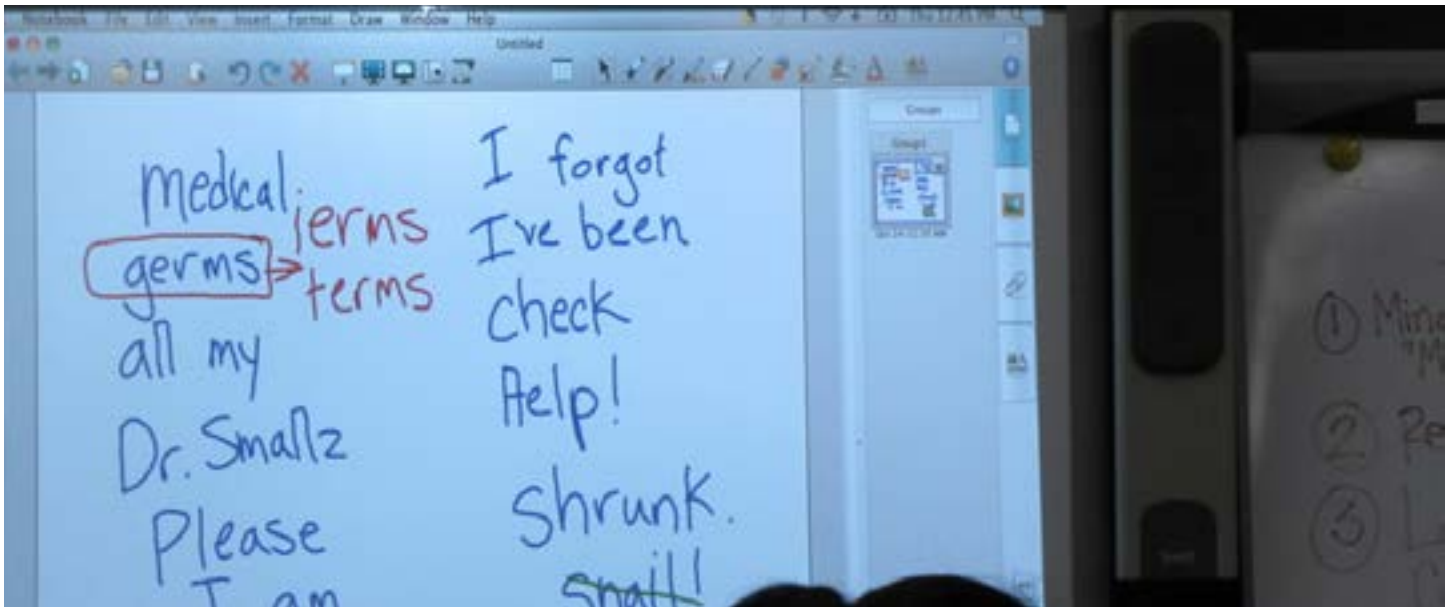
- Differentiation Strategies
- Final assessment support materials and rubric
- Additional resources
- Standards aligned to the mission

TEACHER COLLABORATOR BIO

Leah Hirsch teaches a hands-on and inquiry-based science/math course for 6th graders at **Quest to Learn** in New York City. In her classroom, sixth graders are given opportunities to be scientists, designers, makers, and players. Leah has been teaching science in New York City public school classrooms since 2005. Before teaching, she designed interactive and game-like learning experiences as a Program Director for Fresh Air Fund summer camp and for after-school programming. In 2013, Leah received a fellowship from Math for America and became a member of its first cohort of Master Science Teachers. Her best teaching moments are when a student says something like, "I used to think science is boring... but it's not!"

Since collaboration and iteration are important to our work at Institute of Play, we want to hear your feedback about this resource and its impact on your teaching. To share your thoughts and ideas, please join our Google+ community by clicking on this link: ***Institute of Play Google+ Community****.*

Mission Summary



Students work as a class to decipher a message discovered on a set of microscopic postcards.

During this mission, students play the roles of designers, scientists, doctors, and detectives as they explore cellular biology and the human body. Students begin this mission by taking part in the National Cell City Design Competition sponsored by Shrinkley Labs, a biotech company. Upon completion of the design competition, Dr. Smallz, who works at Shrinkley Labs, contacts the students to ask for their help.

Apparently Dr. Smallz has shrunk himself to save a patient but is experiencing amnesia. Students need to help him figure out where he is inside the patient's body, remind him of the functions and structures of each organ system he visits, and decode any clues that help to solve the medical mystery of the patient's illness. They also need to develop an itinerary for the tiny doctor based on how body systems connect and interact, and eventually help him find a smart way out of the patient's body.

Lastly, they work to determine what is ailing the patient based on gathered evidence and instruct the doctor where to go in the body to administer the treatment. Along the way, students play and design their own games to hone skills and develop content knowledge, but also to develop their understanding of how the human body functions as a complex system with multiple feedback loops.

Essential Questions

- How can we use scientific thinking to solve real problems?
- To what extent should we intervene when someone is ill?

Enduring Understandings

- Human beings are an interactive organization of cells, tissues, organs, and systems.
- Science and medicine have benefited humankind but each raise great ethical issues.
- Gathering and sharing data is an essential part of science.

The "Dr. Smallz" Mission is great for learning because it is just on the brink of a 6th grader's believability; they are always asking "is this real?" and their curiosity about Dr. Smallz' next move keeps them hooked. It also gives them an opportunity to plan the course of their own instruction. As they direct Dr. Smallz from one body system to the next, they are, in a sense, creating the curriculum along with me. This mission also inspires students to change perspectives and empathize with our shrunken doctor protagonist as they imagine what it would be like to be on the inside of a human body looking out. It is a fun learning adventure for them as they help the doctor navigate through the body, while at the same time solving a medical mystery.

- Leah Hirsch, 6th grade teacher, Quest to Learn, New York, NY

Mission Overview

QUEST TITLE	LENGTH*	DESCRIPTION
We Built This City	3 weeks	For the National Cell City Design Challenge, students are challenged to design and build a physical or digital 3D city with buildings and components that mirror different organelles and their functions in a cell.
One Moment in Time	1 week	After their great work with the Cell City Design Challenge, Shrinkley Labs asks students to compete in the company's annual Measurement Olympics. Students are introduced to Dr. Smallz at the end of the quest.
Every Breath You Take	2 weeks	Students are challenged to find out if something is wrong with the patient's respiratory system. Dr. Smallz asks them to design a game to help him figure out how to travel through the respiratory system.
Open Your Heart	2 weeks	Students are challenged to learn about the circulatory system and design an experiment to help Dr. Smallz determine if the patient's circulatory system is working well.
Eat It	2 weeks	Students are challenged to explain how food and energy play a role in the patient's energy level. They must design a meal plan to help the patient regain her strength.
Time to Get Ill	1 week	Students are challenged to create an infographic for Dr. Smallz about the body's immune response.
Bad Medicine	2 weeks	Students diagnose the patient's illness and are asked to debate which treatment is best. They first learn about the nervous before developing their arguments with supporting evidence.

NOTE

Quests #3-#6 can happen in any order depending on where students direct Dr. Smallz to travel next in the human body.

* Based on an assumption of 50-minute classes that meet 5 days a week

Final Mission Assessment

A student writes evidence on the white board to support prescribing Dengithan, which will harm the nervous system, to the sick patient.

For the mission's final assessment, students put forth arguments using all of their knowledge about the human body to recommend a treatment that Dr. Smallz should give the patient. Students use their accumulated list of symptoms of the patient's mystery illness and WebMD to diagnose her with Dengue Fever. Since there is no known cure for Dengue Fever, Dr. Smallz must choose between Pepto-Dengol and Dengithan, both of which will help alleviate the patient's symptoms. However, both medicines have drawbacks: one of them will harm the immune system, the other will harm the nervous system.

In front of science and medical experts from Shrinkley Labs (where Dr. Smallz works), students engage in a debate about which treatment to give Kelly—both of which will compromise a different organ system in the body. The goal of the assessment is to have students support their treatment choice with evidence from their understanding of body systems. See the Appendix for more information about the final assessment.

Quest-by-Quest Details

This section provides more detailed information about each quest to help you develop and design your own version of this mission for your students. Within each quest, we describe its game-like learning experiences and list the types of assessments produced by students as evidence of their learning.
Note that all games designed by Institute of Play are italicized.

Students construct a "vacuole" building as part of the National Cell City Design Challenge during Quest 1.

All assessments used at Quest schools evaluate not only subject matter knowledge and skills of students (aligned to national and state Standards), but also assess 21st century skills. These skills include collaboration, empathy, problem-solving, systems thinking and design thinking. Quest assessments range from embedded and formative (happening while students are learning to help teachers guide instruction) to traditional (quizzes/tests) to performance-based (tasks similar to those in the real world) to self-assessments. We want to prepare students to be successful in college, career, and life in the 21st century, and we believe students need support in building knowledge and skills beyond those measured on standardized tests.

Additionally, when Quest students play games to learn, there are numerous ways that teachers assess the learning enabled through game play. Some examples are:

- Circulate around the room to check for student understanding by observing student game choices, listening to student conversations, and asking questions to students.
- Ask students to create a strategy to help new players win the game.
- Ask students to change the game to help players learn different content and/or skills.
- Create game play scenarios and ask students about possible next game moves.

It is important to note that all of the resources **bolded in blue** in the rest of the document are active weblinks. Check out the example below:

Read our **Games and Learning Design Pack** for more information about using games in your classroom.

Quest 1: We Built This City

3 WEEKS

Shrinkley Labs invites students to compete in the National Cell City Design Competition. In this competition, students need to know the function of each of the cell's structures. They become both researchers and designers, working in teams of 2-3 to create a 3D city in which each building represents an organelle within an animal or a plant cell. They may build physical models or virtual models (using SketchUp or Minecraft), which they present to a group of judges from Shrinkley Labs who decide the winner for the best designed Cell City.

TOPICS & SKILLS COVERED

- Cell theory
- Uni-cellular and multi-cellular organisms
- Structure and function of organelles within cells (plant and animal)
- Relationships among organelles
- Steps to the design process (brainstorming, prototyping, testing, iteration)
- 3-D modeling using physical materials or technological tools (Minecraft, Sketch up)

GAME-LIKE LEARNING EXPERIENCES	ASSESMENT TYPE	DESCRIPTION
Cell City Application letter	Writing (letter)	Students apply to take part in the National Cell City Design Competition sponsored by Shrinkley Labs. In the application letter, students must explain why cells are important and how all cells are similar.
Cell Puzzle	Short responses and research	Students are challenged to complete a cell puzzle. They earn animal and plant cell organelle puzzle pieces as they research organelle structure and function.
Cell Story	Combined board game/digital game	Students play Cell Story to learn more about the functions of various cell organelles by playing organelle cards. As students play different cards, the teacher advances a simulation on the board of a cell carrying out different cellular functions.
Minecraft Cell	Digital game	Students explore the inside of a cell built in **Minecraft**, which has been populated with numerous elements that parallel the functions of real-life cell organelles.
Cellular Warfare	Board game	Students play Cellular Warfare, an Institute of Play board game designed to help students learn the components of a cell by collecting resources, building organelles, and mounting an offensive against an opposing cell while defending their own.
Cell City Model	Physical/digital mode and presentation	Students, in small groups, move through the design process as they create their own cell cities for the National Cell City Design Competition and present their cities to judges.

Quest 2: One Moment in Time

1 WEEK

Since the students' submissions to the Cell City Design Competition were amazing, Shrinkley Labs asks students to be part of their Measurement Olympic team. All the biotech companies in the region enter the Measurement Olympics to prove their prowess at using measurement (metric conversions, mass, density, volume) and measurement tools (triple beam balance, graduated cylinders, tape measure, density cubes). The work of students who have the most accurate and precise measurements is sent to Measurement Olympics judges to see if they can win the best-all-around competition.

At the very end of the quest, the teacher informs the students that has she just received a mysterious bunch of microscopic slides in the mail.

She asks her students to figure out what is on the slides by learning how to use a microscope. Students discover parts of a message on the slides that they must decipher. The message leads them to a website with the first message from Dr. Smallz.

The doctor tells them that he volunteered for the sake of science to shrink himself down to the size of a pinhole, and he has landed inside the nasal passages of his patient. However, during the shrinking process, he forgot all of his medical knowledge, so he needs their help to teach him about the human body. He plans to send frequent emails to the students with descriptions of what he is seeing along with his questions about the human body.

TOPICS & SKILLS COVERED

- Accuracy and precision in using measurement tools
- Unit conversion
- Data collection using a variety of methods
- Microscope use
- Use of math to show and understand phenomena (e.g. draw scale models of microscopic objects)

GAME-LIKE LEARNING EXPERIENCES	ASSESMENT TYPE	DESCRIPTION
Measurement Olympics	Data log	Students engage in different Measurement Olympics events and rotate between events after completing each challenge. Examples include: — 100-mm Density Challenge - comparing densities of objects that are 100 mm long — Volume Relay - finding several volumes of solids and liquids in a specific amount of time — Quarter Jump - measuring and averaging lengths of several quarter (coin) jumps. You make a quarter jump by holding one on each edge and and tossing it on a table at an angle). — Sumo weigh-in – finding the mass of several different objects to determine which one is the "sumo" (i.e. heaviest)
Metric Mystery	Board game	Students play Metric Mystery, an Institute of Play board game designed to help students recognize and use different units of measure, such as centigrams, milligrams and kilograms.
Microscope Slide Mystery	Code-breaking game	Students use microscopes, and discover Dr. Smallz's website by piecing together information from several microscope slides.

Quest 3: Every Breath You Take

2 WEEKS

Students learn from Dr. Smallz that he was first inhaled into the patient's nasal passages and is currently stranded there. They are also introduced to the patient, Kelly Jenkins. Dr. Smallz sends a list of Kelly's initial symptoms, which include high fever, severe headaches, nausea and vomiting, and a skin rash. Students begin to keep track of data that Dr. Smallz sends them about Kelly's vital signs.

Since Dr. Smallz knows he learns best through play, he asks students to make a board game to help him learn about the respiratory system. Students spend time researching the respiratory system before designing their games.

After games are designed, students play each others' games and give feedback during a game jam. When they email their games to Dr. Smallz, they also email a series of questions asking about Kelly's respiratory system. Dr. Smallz sends back a report that requires them to use WebMD to determine whether her respiratory system is healthy. Lastly, students must help the doctor get through the respiratory system to another body system so he can continue to try to figure out why Kelly is sick. He asks students where he should go, and they decide where he should go and how he can get there from the respiratory system.

TOPICS & SKILLS COVERED

- Structure and function of respiratory system
- Role of gases (i.e. oxygen and carbon dioxide) in respiration
- Game design (see Institute of Play's **Games and Learning Design Pack**)

GAME-LIKE LEARNING EXPERIENCES	ASSESMENT TYPE	DESCRIPTION
Respiratory System Board Game	Board game; Writing (peer feedback response sheets)	Students (in pairs or groups) research the respiratory system to design and develop a Respiratory System game. Then, they play each others' games during the game jam and give feedback. Time is given for students to revise games based on peer feedback.
Vital Signs Tracking	Data log	Students record and research Kelly's vital signs to try and diagnose her disease.

Quest 4: Open Your Heart

2 WEEKS

As Dr. Smallz travels through the circulatory system, students must learn about blood, the pulse, heart rate, and the organs and passageways of the circulatory system. Dr. Smallz asks students for a visual of how all the parts of the circulatory system fit together and how blood travels through the system. As they finish up learning about the circulatory system and start to learn about homeostasis, Shrinkley Labs contacts them.

Shrinkley Labs proposes that students do something that has never been done before. They ask students to design experiments for Dr. Smallz to do inside Kelly's body to test how her circulatory system responds to changes in different factors in her environment, such as temperature, exercise, and body position. During the experimental design phase, students test each others' experiments and collect and analyze experimental data. When ready, the students send their experiments to Dr. Smallz and receive back a report with data from their experiments. From the data, they learn that Kelly has low blood pressure, another symptom to add to the list. Dr. Smallz then asks students where he should go next and they produce a proposal for the next body system with supporting evidence for their choice.

TOPICS & SKILLS COVERED

- Structure and function of circulatory system
- Homeostasis and the role of the circulatory system in helping to maintain it
- Experimental design
- Data collection and analysis
- Presentation of data analysis

GAME-LIKE LEARNING EXPERIENCES	ASSESMENT TYPE	DESCRIPTION
Homeostasis	Card game	Students play an Institute of Play game in which students try to maintain homeostasis of factors including temperature, water, oxygen, and nutrients in a constantly changing environment by playing cards to keep the quantity of each factor from getting too high or too low.
Visualizing the Circulatory System	Visual	Students design visuals to show the circulatory system's structure and function. They can use any medium to create their visual, such as **Prezi** (a presentation tool), **Google Sketch-Up**, **Photoshop**, pen and paper, collage, etc.
Circulatory System Simulation	Physical simulation with reflection	Students participate in a class-wide simulation of the circulatory system, flowing throughout the classroom along specific pathways, taking on the roles of organs and blood cells and exchanging tokens representing oxygen, waste, carbon dioxide, and others.
Heart Study	Writing (lab report)	Students design experiments to learn how healthy hearts respond to different factors like emotions, physical activity, caffeine, or cold weather. They analyze their class data (and Dr. Smallz data from Kelly) and present the data in a report format.
Vital Signs Tracking	Data log	Students record and research Kelly's vital signs to try and diagnose her disease.

Quest 5: Eat It

2 WEEKS

After Dr. Smallz enters the digestive system from another body system, students get a series of photos taken by Dr. Smallz. As they learn about the digestive system to figure out Dr. Smallz's location, they receive a frantic email from Dr. Smallz telling them that Kelly has gotten very weak because she hasn't eaten a meal in days. The doctor asks students to teach him about the relationship between energy and food and then propose a meal plan for Kelly that will help her get stronger. He will choose the best meal plan of all those sent to him. To meet this challenge, students must learn about food, vitamins, minerals, and energy to figure out what Kelly needs in her meal plan. In the course of their efforts to make a meal plan for Kelly, they also analyze one day of their own meals to determine the energy they consumed.

Near the end of the quest, students learn from Dr. Smallz that Kelly has some internal bleeding in her digestive tract. Also, Dr. Smallz amazingly remembers that Kelly's family told him that she recently traveled to Panama. He asks students to research and map diseases found in Mexico and Central America and explain to him why some diseases are found in some areas of the world and not in other areas.

TOPICS & SKILLS COVERED

- Structure and function of digestive system
- Energy and food (including food chains)
- Biochemistry of food
- Epidemiology
- Mapping skills

GAME-LIKE LEARNING EXPERIENCES	ASSESMENT TYPE	DESCRIPTION
Digestion Simulation	Physical simulation*	Students work together as different digestive organs to break down and digest a "food particle" made of paper and plastic bags to get at the "nutrients" represented by M&Ms inside.
Comic Food Chain	Comic strip	Students use **Comic Life** to illustrate how energy is transferred among living organisms.
Meal Plan Proposal	Presentation (visual and writing)	Students create a presentation to convince Dr. Smallz that their meal plan is the best one for Kelly. They include data from experiments about macromolecules and minerals.
Tropical Disease Map	Map	Students map common diseases in Central America using **Google Maps** and list the diseases and symptoms that might be causing Kelly's illness based on research using **WebMD** and **CDC** and **WHO** websites.
Vital Signs Tracking	Data log	Students record and research Kelly's vital signs to try and diagnose her disease.

* See **"What Happens When You Eat?"**

Quest 6: Time to Get Ill

1 WEEK

Students receive an SOS email from Dr. Smallz telling them that his microscopic ship is being attacked by certain cells in the body and he does not know what is happening. The doctor vaguely remembers something about the immune system and how some cells can attack other cells. He asks students to send him an infographic about the immune system and its response to invaders in the human body. When students send infographics to him, they receive a note that Kelly's internal bleeding has worsened. Students need to help him diagnose Kelly as soon as possible.

TOPICS & SKILLS COVERED

- Structure and function of immune system
- Design skills

GAME-LIKE LEARNING EXPERIENCES	ASSESMENT TYPE	DESCRIPTION
Virus Attack	Analog game	Students play Virus Attack, an Institute of Play board game designed to help students learn about the immune system. Players must save the health of a body by producing white blood cells, antibodies, and T-cells to destroy viruses.
Immune Infographic	Infographic	Students create an infographic about the immune system and its response to invaders in the human body. Students can create physical or digital (using **infogr.am**) infographics.
Vital Signs Tracking	Data log	Students record and research Kelly's vital signs to try and diagnose her disease.

Quest 7: Bad medicine

2 WEEKS

Students have accumulated a list of vital signs and symptoms of Kelly's mystery illness. Now they must do some online research to diagnose her. They figure out that Kelly has Dengue Fever, a tropical disease. Since there is no known cure for Dengue Fever, Dr. Smallz must choose between two medicines to alleviate the patient's symptoms, Pepto-Dengol and Dengithan. However, both of these drugs have drawbacks: one of them will harm the immune system, the other will harm the nervous system. Before they can prepare for the debate, students need to learn about the nervous system and ethics in science.

In teams, students present different sides of the debate by advocating for the value and importance of the nervous or immune system over the other to a panel of experts from Shrinkley Labs. After the debate, experts vote on the treatment and students wait to hear if Kelly survives.

TOPICS & SKILLS COVERED

- Structure and function of nervous system
- Ethics of science
- Discussion skills
- Argumentation with supporting evidence
- Presentation skills

GAME-LIKE LEARNING EXPERIENCES	ASSESMENT TYPE	DESCRIPTION
Vital Signs Tracking	Data log	Students record and research Kelly's vital signs and diagnose her disease.
Short Films Review	Writing (opinion)	Students use **Nova's Body and Brain website** to watch 4-5 video shorts (of their choice) on the nervous system. They write a review of the videos that includes facts about the structure and function of the nervous system.
Socratic Smackdown	Discussion Game	Students play **Socratic Smackdown**, an Institute of Play game designed to help students learn how to discuss texts and use textual evidence to make connections and ask thought-provoking questions. In the game, students discuss articles about ethics of science.
Treatment Debate	Debate	Students debate whether to give Dengithan or Pepto Dengol (one harms nervous system and the other harms endocrine system) to Kelly. Students use their research of nervous and immune systems to prepare for and present their side of the debate.

Appendix

DIFFERENTIATION STRATEGIES

- Word wall of vocabulary and definitions (with visuals when appropriate)
- Student role assignments for group projects
- Guided support materials for projects, such as the final debate
- Visual guides for different processes (e.g. how to use a microscope)
- Audio technology at **kidshealth.org** to listen and learn about different body system
- Student choice about ways to show learning (e.g. physical vs. digital model)
- Exemplars of student projects from previous years
- Experiments designed based on student interest
- Peer feedback and time for iteration
- Use of kinesthetic experiences (Circulatory System and Digestion Simulations)
- Research sources with appropriately leveled readings

Final Assessment Supporting Materials

BAD MEDICINE DEBATE PREP PACKET

My group's body system to defend is _____

The structure of the Bad Medicine Debate is as follows:

- Opening
- Body system components
- Body system core mechanics
- Challenges
- Counterpoint and closing

A. Opening

1. What are the main functions of your body system?
2. Design a visual to show the components of your system and how they are related.
3. What is the main reason that your system is more important than the other group's system?

B. Components

1. For nervous system group:
   a. Explain the functions of the brain, spinal cord, and neurons.
   b. Explain the main components of the brain.
   c. Explain the functions of the Central Nervous System and Peripheral Nervous System.
   d. Why are components of the nervous system more important than immune system components?
2. For immune system group:
   a. Explain the functions of the skin, thymus, spleen, lymph system, bone marrow, white blood cells, and antibodies.
   b. Why are immune system components more important than nervous system components?

C. Core Mechanics

1. For nervous system:
   a. Explain how brain, neurons, and spinal cord work together to respond to stimuli.
   b. Explain the somatic and autonomic nervous systems.
   c. Why are your system's core mechanics more important than the other system's core mechanics?
4. For immune system:
   a. Explain steps of immune system using the following terms (macrophage, helper T-cells, B-cells, killer T-cells).
   b. Why are your system's core mechanics more important than the other system's core mechanics?

D. Challenges

1. For nervous system:
   a. Explain possible injuries to the nervous system.
   b. Argue that the immune system already has enough challenges.
2. For immune system
   a. Explain how the immune system can be weakened.
   b. Argue that the nervous system already has enough challenges.

E. Counterpoint and Closing

1. List at least 2 possible counter-arguments by the other group.
2. Explain reasons why these counter-arguments are faulty.

Final Assessment Rubric

Below are categories used by Quest teachers to evaluate student knowledge, skills and 21st century skills for this mission. Please feel free to expand the rubric to include different degrees of understanding and mastery (e.g. novice, apprentice, senior and master).

CATEGORY	CRITERIA	DESCRIPTION
Debate Prep	Research	Fully completes Bad Medicine Debate Prep Packet for immune or nervous system.
Debate Presentation	Body System Expertise	Accurately describes the components of the immune system or nervous system with confidence.
	Argument	Includes an argument why the immune or nervous systems is more important with at least 3 pieces of supporting evidence.
	Presentation	Clearly rehearsed, uses eye contact, speaks to judges respectfully and clearly, and is well-prepared. Uses visual aids to enhance presentation.
	Persuasion	Able to use clear arguments to convince judges to take your side. Able to rebut arguments of opposing teams. Able to answer all questions correctly and clearly.
Overall	Teamwork	Works together with a team to plan and coordinate work towards a mutual goal. Demonstrates leadership skills, including the ability to persuade and guide others; and resolve conflicts cooperatively.
	Time Management	Completes all tasks efficiently and effectively in and out of class.

Website Resources

Getting Started

Source Name SEPUP: Science Education for Public Understanding Program
URL sepuplhs.org

Source Name Prentice Hall – Science Explorer
Location Cells & Heredity
Location Human Body and Health

Cells and Organelles

Site Name Cells Alive!
URL www.cellsalive.com

Site Name Cellular Biology
URL library.thinkquest.org/12413/structures.html

Human Body Systems

Site Name Inner Body
URL www.innerbody.com

Site Name Kids Health
URL www.kidshealth.org

Site Name Smithsonian Science Education Center
URL www.ssec.si.edu/ms-teaching-resources

Site Name Einstein Project Resource List
URL www.einsteinproject.org/media/64618/human%20body%20systems.07.03.2012.pdf

Medicine & Epidemiology

Site Name WebMD
URL www.webmd.com

Site Name Center for Disease Control and Prevention
URL www.cdc.gov/

Site Name World Health Organization
URL www.who.int/en/

Standards Alignment

Common Core Standards

Mathematics Standards

CCSS.Math.Content.6.RP.A.3
Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

ELA Standards

CCSS.ELA-Literacy.RST.6-8.3
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CCSS.ELA-Literacy.RST.6-8.4
Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant togrades 6–8 texts and topics.

CCSS.ELA-Literacy.RST.6-8.7
Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CCSS.ELA-Literacy.RST.6-8.9
Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

CCSS.ELA-Literacy.SL.6.4
Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

CCSS.ELA-Literacy.SL.6.5
Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

Standards Alignment

New York State Science Standards

Standard 1
Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

Standard 2
Students will access, generate, process, and transfer information using appropriate technologies.

Standard 4
The Living Environment

Key Idea 1: Living things are both similar to and different from each other and from nonliving things.

Performance Indicator 1.1: Compare and contrast the parts of plants, animals, and one-celled organisms.

1.1a Living things are composed of cells. Cells provide structure and carry on major functions to sustain life. Cells are usually microscopic in size.

1.1b The way in wthich cells function is similar in all living things. Cells grow and divide, producing more cells. Cells take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or an organism needs.

1.1c Most cells have cell membranes, genetic material, and cytoplasm. Some cells have a cell wall and/or chloroplasts. Many cells have a nucleus.

1.1d Some organisms are single cells; others, including humans, are multicellular.

1.1e Cells are organized for more effective functioning in multicellular organisms. Levels of organization for structure and function of a multicellular organism include cells, tissues, organs, and organ systems.

Performance Indicator 1.2: Explain the functioning of the major human organ systems and their interactions.

1.2a Each system is composed of organs and tissues which perform specific functions and interact with each other, e.g., digestion, gas exchange, excretion, circulation, loco- motion, control, coordination, reproduction, and protection from disease.

1.2b Tissues, organs, and organ systems help to provide all cells with nutrients, oxygen, and waste removal.

1.2c The digestive system consists of organs that are responsible for the mechanical and chemical breakdown of food. The breakdown process results in molecules that can be absorbed and transported to cells.

1.2d During respiration, cells use oxygen to release the energy stored in food. The respiratory system supplies oxygen and removes carbon dioxide (gas exchange).

1.2f The circulatory system moves substances to and from cells, where they are needed or produced, responding to changing demands.

1.2h The nervous and endocrine systems interact to control and coordinate the body's responses to changes in the environment, and to regulate growth, development, and reproduction. Hormones are chemicals produced by the endocrine system; hormones regulate many body functions.

1.2j Disease breaks down the structures or functions of an organism. Some diseases are the result of failures of the system. Other diseases are the result of damage by infection from other organisms. Specialized cells protect the body from infectious disease. The chemicals they produce identify and destroy microbes that enter the body.

Standard 4
Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.

Standard 7
Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions.

Process Skills

- Follow safety procedures in the classroom and laboratory
- Use appropriate units for measured or calculated values
- Safely and accurately use the following measurement tools:
  - Metric ruler
  - Balance
  - Graduated cylinder

Standards Alignment

21st Century Skills

At Quest schools, we integrate 21st century skills in all Missions and Quests.

Systems Thinking	A systems thinker takes a dynamic systems perspective, demonstrating understanding of part-to-whole feedback dynamics (including time factors); using visual mapping tools, writing, and physical models to learn about how systems work, and to represent, invent, and communicate about systems.
Communication	Use of oral, written, performative, and visual forms of language to formulate, exchange, present, and reflect on ideas: shared understanding is the aim of communication.
Teamwork	Students plan and coordinate work towards a mutual goal; understand and regulate themselves as a team member; demonstrate leadership skills, including the ability to persuade and guide others; and resolve conflicts cooperatively.
Time Management	Time management is the ability to achieve an effective use of time while performing goal-directed activities. It encompasses the ability to complete tasks within an expected time frame while maintaining outcome quality, through mechanisms such as planning, organizing, prioritizing, or multitasking.

Continued Learning

Now that you've explored this mission pack, we hope you are inspired to learn more about game-like learning. Below is additional information to support you in continuing to build and share your learning.

We want to hear from you

We want to hear from you about your experience with this mission pack.

What did you like about this mission pack?
What might you use in your teaching?
What do you want to learn more about?

Please join the **Institute of Play Google+ community** to share your thoughts and ideas!

We want you to learn more

If you are interested in learning more, please visit these following websites:

Institute of Play

Quest to Learn, NYC

CICS ChicagoQuest

We also offer other educator resources

Q School Design Pack
This pack highlights ten innovative components of the Quest school model.

Q Curriculum Design Pack
This pack provides tools and methods for you to use to design game-like curriculum for your classroom.

Q Systems Thinking Design Pack
This pack provides tools and methods for you to use to integrate systems thinking into your teaching.

Print and Play Games
These Institute of Play games are designed with support from Quest teachers and played by Quest students.

We want you to share these resources

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We want to thank our partners

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About Institute of Play

We design experiences that make learning irresistible.

The Institute pioneers new models of learning and engagement. We are a not-for-profit design studio, founded in 2007 by a group of game designers in New York City. We are now home to an interdisciplinary team of designers, strategists and learning practitioners. Our first project was the design and implementation of an innovative New York City public school, called Quest to Learn.

At the core of the experiences we design are games, play and the principles that underlie them.

Using these principles, we have created institutions, games, programs, events, digital platforms and products. Our work unlocks the transformative power of people as seekers and solvers of complex problems, risk takers, inventors and visionaries. We work wher- ever people are: in communities, businesses, schools, cultural and civic institutions.

We empower people to thrive as active citizens in a connected world.

We are not preparing for a distant future. We are about meeting people where they are and igniting their potential now. We work with a diverse set of partners to make it happen, such as Electronic Arts, Intel, Educational Testing Service, the Mozilla Foundation, the Smith- sonian, Parsons the New School for Design, Chicago International Charter Schools, DePaul University, E-Line Media and others.

A Selection of Our Work

GlassLab

An unprecedented collaboration between leaders in the commercial games industry and experts in learning and assessment, GlassLab aims to leverage digital games as powerful, data-rich learning environments that improve the process of learning with formative assessments teachers can trust.

Play@Your Org

With a hands-on exploration of games and design, Play@ Your Org workshops are designed to help businesses, cultural institutions and other organizations integrate the power of play-based learning in their work to maximize participation and engagement.

Playtime Online

A live hour-long webinar series, Playtime Online explores the work of leading organizations in the field of games and learning, the people who do it and why it matters in the world today. The series also offer a live forum to share learning within the Playtime community.

For more information, please visit **www.instituteofplay.org**