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PROBLEM 1: OM-Mazing Race

Ready, set, go! In this problem teams will design, build, and operate an all- terrain vehicle that transports riders on a race for a prize. The performance will include a race to three original, team-created destinations and each leg of the race will include an obstacle that a rider and vehicle must overcome. The performance will include a host that narrates the action, and it will conclude with the realization that the prize for finishing the race was not as exciting as the Odyssey they took along the way.

Science	Technology	Engineering	Mathematics
Understand the properties of objects and materials, and the changes in properties and matter in order to create one vehicle and its method of propulsion.	Use technology tools to enhance learning, increase productivity, and promote creativity.	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation of the vehicle and propulsion systems, etc.
Research/understand energy, its sources, and how it applies to different propulsion systems. Research/understand simple reactions and their outcomes.	Research different methods of control, steering, and propulsion in designing and building the vehicle.	Apply a structured approach to solving problems: define problem, brainstorm ideas, research, identify criteria, explore the possibilities, make a model, evaluate, communicate results, and revise to improve performance.	Utilize estimation, measurement, computational skills, and spatial/geometric relationships in order to: (a) Work within budgetary, time, and space limitations. (b) Analyze scoring criteria to prioritize problem elements such as vehicle and design, and propulsion systems.
Research/understand simple machines, transmissions, leverage, mechanics of motion, inertia, friction, braking.	Research different sources of energy for vehicle's propulsion.	Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.	Solve real-world and mathematical problems involving area, surface area, and volume.
Research/understand the construction and materials in the design of vehicles and propulsion systems.	Use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.	Design, test and build systems, components, or processes to meet desired needs within realistic constraints as they relate to vehicles, propulsion systems, obstacles, etc.	Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.
Apply scientific principles to design, construct, and test a device that either minimizes or maximizes energy transfer.	Demonstrate the ability to use technology for research, critical thinking, decision making, communication and collaboration, creativity and innovation.	Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.	

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PROBLEM 2: Mech-Animal Sidekick

The saying goes “dog is man’s best friend” but this year OMers get the chance to invent their own bestie! In this problem, teams will design, build, and operate an original robotic animal that has the ability to make people happy. In the performance, the Mech-Animal will perform various tricks that cheer people up. When it suddenly goes missing, the people search for it and find the Mech-Animal in a very unusual place. The performance will also include live music, a toy for the Mech-Animal, and a trainer character that explains the tricks.

Science	Technology	Engineering	Mathematics
Understand the properties of objects and materials, and the changes of properties in matter in order to create devices.	**Use technology tools to enhance learning, increase productivity, and promote creativity.**	**Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.**	**Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation of devices to complete tasks.**
Research and develop an understanding of how energy may be used to power devices. **Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.** **Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.**	**Use productivity tools to collaborate in constructing technology-enhanced models.** **Use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.**	**Apply a structured approach to solving problems: define problem, brainstorm ideas, research, identify criteria, explore the possibilities, make a model, evaluate, communicate results, and revise to improve performance.** **Evaluate competing design solutions based on jointly developed and agreed- upon design criteria.**	**Utilize estimation, measurement, computational skills, and spatial relationships in order to:** **(a) Work within budgetary, time, and space limitations.** **(b) Explore multiple ways an animated creature might be able to change appearance.** **(c) Analyze scoring criteria to prioritize problem elements such as quality and creativity of the performance, creativity of engineering of how the creature changes appearance and completes tasks, and the originality and effectiveness of the searcher character.**
Research and develop an understanding of simple machines, leverage, laws of motion, mechanics, and the effect of applied force on objects to complete the tasks.	**Employ technology in the development of strategies for solving problems in the real world.**	**Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.**	**Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.**
Research/understand simple reactions and their outcomes.	**Understand and use technology systems.**	**Design, create and build a solution in which an animated creature can change appearance and complete tasks.**	**Make decisions about units and scales that are appropriate for problem situations involving measurement in order to design attention-getting effects.**

PROBLEM 3: *Classics…*Cooking with Books

Classic cooking takes on a new meaning as teams create a performance about an original chef character that is inspired by fictional literary characters and events. Teams will choose from selected classic literature and create a gourmet meal based on their chosen book. The performance will include a setting from the book that inspired the meal, a team-created cooking gadget, and a dinner party featuring the meal that includes a character from the book.

Science	Technology	Engineering	Mathematics
Understand the properties of objects and materials, and the changes of properties in matter in order to design the "recreation".	**Use technology tools to enhance learning, increase productivity, and promote creativity.**	**Design, test, and build a system, component, or process to meet desired needs within realistic constraints.**	**Use visualization, spatial reasoning, and geometric modeling to solve problems in the "recreation."**
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	**Use productivity tools to collaborate in constructing creative works.**	**Apply the engineering design process, troubleshooting, research and development, invention and innovation, and experimentation in problem solving and engineering design.** **Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.**	**Utilize estimation, measurement, computational skills, and spatial/geometric relationships in order to:** **(a) Work within budgetary, time, and space limitations.** **(b) Analyze scoring criteria to prioritize problem elements such as the team-created court, the historic royal court, the team created instrument, etc.**
Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.	**Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts, and solving authentic problems.**	**Use engineering as a vehicle for creative and critical thinking and inquiry.**	**Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.**
Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.	**Communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models, or simulations.**	**Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.**	**Look closely to discern a pattern or structure.**
Develop a diagram or simple physical prototype to convey a proposed object, tool, or process.	**Utilize technology in research and design in all aspects of the solution.**	**Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.**	

PROBLEM 4: Save Me Structure

OMers to the rescue! In this problem, teams will create a performance about an unusual animal rescue character that needs to find homes for balsa wood and glue animals. Two animals will represent actual living animal species an another will be team-created. The animal rescue character will test if a home is safe by balancing and holding as much weight as possible. The performance will also include one animal getting a check-up, a humorous veterinarian character, and the creative use of **ARM & HAMMER** ™ Baking Soda.

Science	Technology	Engineering	Mathematics
Understand the properties of objects and materials, and the changes in properties and matter in order to create weight-bearing structures.	**Use technology tools to enhance learning, increase productivity, and promote creativity.**	**Apply a structured approach to solving problems: define problem, brainstorm ideas, research, identify criteria, explore the possibilities, make a model, evaluate, communicate results, and revise to improve performance.**	**Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation a balsa wood structure.**
Research and understand material properties of balsa and various adhesives.	**Use productivity tools to collaborate in constructing technology-enhanced models and produce other creative works.**	**Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.**	**Utilize geometry and/or trigonometry to analyze component structures and how those components will be stacked as the final structure.**
Understand effects of various environments on materials. **Evaluate safety issues involved with materials being used in construction of the structure, particularly relating to structural collapse.**	**Utilize technology in research and design in all aspects of the solution.** **Demonstrate the ability to use technology for research, critical thinking, decision making, communication and collaboration, creativity and innovation.**	**Apply contemporary engineering tools and technology to define, analyze, model, and build prototype structures made of multiple, separate components.** **Evaluate connections – surface area of joining pieces, geometry of joints.**	**Utilize estimation, measurement, computational skills, and spatial relationships in order to:** **(a) Work within budgetary, time, and space limitations.** **(b) Analyze scoring criteria to prioritize problem elements such as weight held, creativity of the performance, etc.** **Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.**
Understand how design of a structure affects weight transfer through the structure and how weight placement impacts the ability to hold weight without collapsing.	**Use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.**	**Evaluate structural characteristics of balsa wood and glued connections.**	

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PROBLEM 5: AstronOMical Odyssey!

OMers always shoot for the stars, and this problem is no different! Many civilizations have used stories, myths, and legends to explain the stars in the sky and their patterns. In this problem, teams will create a humorous performance set in a team-created "historical" civilization that presents constellations and original stories explaining each one. The performance will also include a humorous astronomer character with a "stellar" costume, a lighting effect, and a shooting star!

Science	Technology	Engineering	Mathematics
Understand the abilities of technological design.	Use technology tools to enhance learning, increase productivity, and promote creativity.	Design, test, and build a system, component, or process to meet desired needs within realistic constraints.	Make decisions about units and scales that are appropriate for problem situations involving measurement in order to design attention-getting effects.
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	Use productivity tools to collaborate in constructing technology-enhanced models and produce other creative works.	Apply the engineering design process, troubleshooting, research and development, invention and innovation, and experimentation in problem solving and engineering design.	Utilize estimation, measurement, computational skills, and spatial relationships in order to: (a) Work within budgetary, time, and space limitations. (b) Analyze scoring criteria to prioritize problem elements.
Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.	Employ technology in the development of strategies for solving problems in the real world, including those related to social situations.	Use engineering as a vehicle for creative and critical thinking and inquiry.	Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.
Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.	Communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models, or simulations to create attention-getting effects.	Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.	Look closely to discern a pattern or structure.
Develop a diagram or simple physical prototype to convey a proposed object, tool, or process.		Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints. Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.	

PRIMARY PROBLEM (Grades K-2): It's a Wonderful World!

Travel back in time as OMers explore the Wonders of the World. In this problem, teams will create a performance about the Seven Wonders and create an original wonder that celebrates an achievement in our modern time. A time traveler character will take an architect on a trip to the past to find inspiration for this new creation. The performance will include an ancient setting, original artwork depicting a Wonder, and a creative time machine.

Science	Technology	Engineering	Mathematics
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	**Use technology tools to enhance learning, increase productivity, and promote creativity.**	**Design, test, and build a system, component, or process to meet desired needs within realistic constraints.**	**Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation of various features, exhibits and displays.**
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.	**Use productivity tools to collaborate in constructing technology-enhanced models of various displays other creative works.**	**Apply the engineering design process, troubleshooting, research and development, invention and innovation, and experimentation in problem solving and engineering design.**	**Utilize estimation, measurement, computational skills, and spatial relationships in order to:** **(a) Work within budgetary, time, and space limitations.** **(b) Analyze scoring criteria to prioritize problem elements such as creativity, presentation quality, display use and impact, performance, humor, and character.**
Ask questions, make observations, and gather information about a situation.	**Employ technology in the development of strategies for solving problems in the real world.**	**Use engineering as a vehicle for creative and critical thinking and inquiry.**	
Research/understand energy, its sources, and how it applies to different propulsion systems.	**Understand and use technology systems.**	**Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.**	
Research/understand simple machines, transmissions, leverage, mechanics of motion, inertia, friction, braking.		**Recognize design is a creative process and everyone can design solutions to problems.**	

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SPONTANEOUS:

Spontaneous is the "short term" portion of Odyssey of the Mind, in which students are given a problem and must solve it in a given amount of time, on the spot. Some spontaneous problems build verbal skills, some build mechanical skills, and some build both; all help improve problem solving skills. Spontaneous problems vary from hands-on problems (e.g., use materials to build/design/change an item), to verbal problems (e.g., name types of trees).

Science	Technology	Engineering	Mathematics
Use innovation to solve problems.	**Utilize innovation in the creative use of everyday objects (e.g., toothpicks, clay, and paper plates) as tools and materials to solve problems.**	**Apply knowledge of science, technology, engineering, and mathematics to define, analyze, and solve problems**	**Utilize estimation, measurement, computational skills, and spatial relationships in order to:** **(a) Work within time and space limitations outlined in the problem.**
Apply an intuitive understanding of gravity, motion, force, and other physics concepts.	**Implement nontraditional communication methods (gestures, tapping on table) to brainstorm and solve problems.**	**Utilize engineering design process to define roles of team members (who will build, who will keep track of time), brainstorm (what materials will be used, how will solution be presented), and communicate possible solutions, and to reflect upon outcomes.**	**Analyze scoring criteria (what is worth the most points) to prioritize problem elements (what should we do first to get a higher score?)**
Apply an understanding of the composition, properties, and creative use of materials. (e.g., what can we use to support the structure, what can we use to make it taller, etc.)		**Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.**	
Test alternate hypotheses. (e.g., what is another way to build this?)		**Evaluate competing design solutions based on jointly developed and agreed- upon design criteria.**	
Evaluate results.			
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.			

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