



# Odyssey of the Mind®

## How OM Meets Education Standards

The Beyond the Box experience

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### PROBLEM 1: Off the Rails

All aboard! OMers become conductors and engineers as they design, build, and operate a train vehicle. As the train travels the course it will have a new car attached at each stop. Along the route it will encounter challenges that make the train travel in different ways. After all of its cargo is picked up, the items will be unloaded and assembled into a work of art. The performance will also include the use of ARM&HAMMER™ Baking Soda, a humorous conductor character, and a villain character that tries to prevent the train from getting to its destination. *\*Sponsored by 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 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 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: <ul style="list-style-type: none"> <li>(a) Work within budgetary, time, and space limitations.</li> <li>(b) Analyze scoring criteria to prioritize problem elements such as vehicle and design, and propulsion systems.</li> </ul> |
| 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.                                                                                                                            |                                                                                                                                                                                                                                                                                                                                            |
| Research/understand simple reactions and their outcomes.                                                                                                  |                                                                                                                                                                        |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                            |



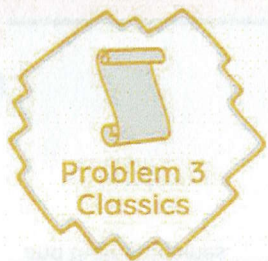


## Problem 2: Lost in OMERland

Getting lost often leads to unexpected opportunities! In this problem OM teams will design, build, and operate a Technical Trip Assistant only to find their voice activated-device has a few malfunctions that result in hilarity. While they set out to explore a new place, the device gives a humorous answer to a question, wrong directions that take them to an unexpected location, and a silly translation. All props and backdrops must fit inside two suitcases.

| 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.                                                                                | Use productivity tools to collaborate in constructing technology-enhanced models.                                                                                      | 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 relationships in order to: <ul style="list-style-type: none"> <li>(a) Work within budgetary, time, and space limitations.</li> <li>(b) Explore multiple ways an animated creature might be able to change appearance.</li> <li>(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.</li> </ul> |
| 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.                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 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.                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                  | Use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



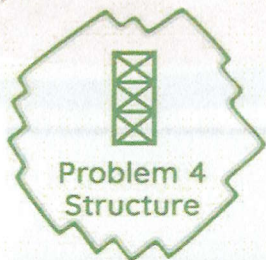


### PROBLEM 3: *Classics...The Epic Quest*

OMers, are you ready to get EPIC? Quests from history have been passed from generation to generation through many art forms, including poetry. OMers will create an epic poem that details a team-created quest that is acted out in the performance. During the quest, the characters encounter an original beast, will rescue someone, and will overcome an epic challenge. The performance will use colors to help depict different settings.

| 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. | Utilize estimation, measurement, computational skills, and spatial/geometric relationships in order to: <ul style="list-style-type: none"> <li>(a) Work within budgetary, time, and space limitations.</li> <li>(b) Analyze scoring criteria to prioritize problem elements such as the team-created court, the historic royal court, the team created instrument, etc.</li> </ul> |
| 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.                   |                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                                                         |                                                                                                                                                     | Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.                                                                           |                                                                                                                                                                                                                                                                                                                                                                                    |



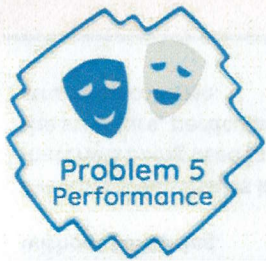


## PROBLEM 4: Life's a Ball!

Party Time! In this problem, teams will create a performance about throwing a party or a ball. The team will design and build a balsa wood structure that is tested by balancing and supporting as much weight as possible. At intervals various balls will be rolled to collide with the structure. The performance will include a creative “ball” character and a party guest that explains the impact of the collisions using team-created terms.

| 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 trigonometry to analyze component structures and how those components will be stacked as the final structure.                                                                                                                                                                                                                                                                                                                                          |
| Understand effects of various environments on materials.                                                                                                           | Utilize technology in research and design in all aspects of the solution.                                                                                              | Apply contemporary engineering tools and technology to define, analyze, model, and build prototype structures made of multiple, separate components.                                                                       | Utilize estimation, measurement, computational skills, and spatial relationships in order to: <ul style="list-style-type: none"> <li>(a) Work within budgetary, time, and space limitations.</li> <li>(b) Analyze scoring criteria to prioritize problem elements such as weight held, creativity of the performance, etc.</li> </ul> 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.                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Evaluate safety issues involved with materials being used in construction of the structure, particularly relating to structural collapse.                          | Demonstrate the ability to use technology for research, critical thinking, decision making, communication and collaboration, creativity and innovation.                | Evaluate connections – surface area of joining pieces, geometry of joints.                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |



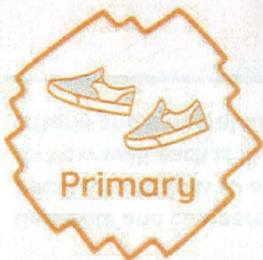


## PROBLEM 5:Taller Tales of John Jivery

No one can tell a story like an OMer! In this problem, teams will create and present a humorous performance about an original tall tale. The tale will include a team-created hero or heroine that performs an incredible feat, a unique explanation of how something began or came to be, and a surprise for the audience. Each event will be accompanied by a visual weather effect that represents an emotion.

| 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: <ul style="list-style-type: none"> <li>(a) Work within budgetary, time, and space limitations.</li> <li>(b) Analyze scoring criteria to prioritize problem elements.</li> </ul> |
| 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): Clowning Around With Science

What kind of hair do oceans have? Wavy! In this problem, OM teams will create an original performance about a group of comedy performers that teach lessons about natural science. The lessons will also include a visual effect, a sound effect, and jokes.

| 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: <ul style="list-style-type: none"> <li>(a) Work within budgetary, time, and space limitations.</li> <li>(b) Analyze scoring criteria to prioritize problem elements such as creativity, presentation quality, display use and impact, performance, humor, and character.</li> </ul> |
| 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.                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                   |





## 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:<br>(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.                             |                                                                                                                                                 |                                                                                                                                                                                                                                                               |                                                                                                                                                                      |