Odyssey of the Mind™

Meeting STEM, Common Core, and 21st Century Skills through

Creative Problem Solving

www.odysseyofthemind.com

Odyssey of the Mind and Educational Initiatives

PROBLEM 1 (VEHICLE)

Runaway 'Train'

The team's problem is to design, build and operate one or more vehicles that will travel on tracks and make stops at different stations without touching the floor. While traveling between stations, the vehicles must overcome obstacles —moving uphill, towing something, and more. The theme of the performance will explain the vehicle's difficulties on the track and will include a 'conductor' character. Once the vehicle reaches its final destination it will display a flag or banner during a victory lap!

STEM Initiative

Science	Technology	Engineering	Mathematics
Understand the properties of objects and materials, and the changes in properties and matter in order to create one or more vehicles, the tracks they travel including obstacles to be overcome, and their method(s) of propulsion. Research/understand energy, its sources, and how it applies to different propulsion systems. Research/understand simple machines, transmissions, leverage, mechanics of motion, inertia, friction, braking. Research/understand the construction and materials in the design of vehicles, tracks with obstacles, and propulsion systems.	Use technology tools to enhance learning, increase productivity, and promote creativity. Research different methods of control, steering, and propulsion in designing and building the vehicle; how the vehicle might overcome specified obstacles; how to display a flag or banner. Research different types of tracks and how they might be constructed. Research different sources of energy for vehicle's propulsion, including at least one source which must be self-contained.	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. 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. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team. Design, test and build systems, components, or processes to meet desired needs within realistic constraints as they relate to vehicles, tracks, propulsion systems, obstacles, etc.	Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation of the vehicle and propulsion systems, tracks with obstacles, etc. 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 track design, propulsion systems, overcoming obstacles, portrayal of humorous conductor, etc.

Odyssey of the Mind and Educational Initiatives

PROBLEM 2 (TECHNICAL)

Experiencing Technical Difficulties

The problem is to design, build, and demonstrate various devices that complete specific tasks. The team will create a theme where technical failures must be resolved through completing the tasks. There will be a list of tasks to choose from including ring a bell, change the wording on something, sound an alarm, move an object, etc. There will also be a mysterious engineer character. Of course, there's a twist — all of the devices must be powered by rubber bands!

STEM Initiative

Science	Technology	Engineering	Mathematics
Understand the properties of objects and materials, and the changes of properties in matter in order to create multiple rubber band powered devices that will complete multiple tasks. Research and develop an understanding of how energy may be stored and released in elastic materials to power the devices. 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.	Use technology tools to enhance learning, increase productivity, and promote creativity. Use productivity tools to collaborate in constructing technology-enhanced models that simulate the creation of devices and the five tasks they are to perform, such as ring a bell or move an object, etc. Employ technology in the development of strategies for solving problems in the real world. Understand and use technology systems.	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. 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. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team. Design, create and operate devices that complete several different tasks.	Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation of devices to complete tasks. 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 quality and creativity of the performance, creative use of rubber bands to power devices, creativity of the portrayal of the mysterious engineer, etc.

Odyssey of the Mind and Educational Initiatives

PROBLEM 3 (CLASSICS)
Pandora's Box

In this classics problem, teams will put a video game spin on the story of Pandora's Box. A gamer character will take on this multi-level game inspired by the Greek myth. The game will include a prologue that depicts the original story of Pandora's Box, three characters representing different evils that escaped the box, and a power meter that represents the gamer character's health. To beat the game, the player will advance to the final level where it will release hope into the world.

STEM Initiative

Science	Technology	Engineering	Mathematics
Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. Understand the properties of objects and materials, and the changes of properties in matter in order to create a sound. 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. Use productivity tools to collaborate in constructing technology-enhanced sound and power meter and produce other creative works. Demonstrate a sound understanding of technology concepts, systems, and operations. Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.	Design, test, and build a system, component, or process to meet desired needs within realistic constraints. Apply the engineering design process, troubleshooting, research and development, invention and innovation, and experimentation in problem solving and engineering design. Use engineering as a vehicle for creative and critical thinking and inquiry. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.	Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation of a video game. 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 creativity of the gamer character, the game, the power meter, etc. Solve problems involving measurement and estimation of intervals in order to create a power meter.

Odyssey of the Mind and Educational Initiatives

PROBLEM 4 (STRUCTURE)
Lose Your Marbles

This problem requires teams to design, build, and test a structure, made only of balsa wood and glue, that will balance and support as much weight as possible. The structure will also hold five marbles that will be released during weight placement as a result of a team-created device removing a piece of the structure. After the crusher board and one additional weight are placed on top of the structure, the first marble will be released. After the next weight is supported, the team will use its device to release another marble, and so on. The team will incorporate weight placement and "losing your marbles" into the theme of the performance.

STEM Initiative

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. Research and understand material properties of balsa and various adhesives. Understand effects of various environments on materials. Understand how design of a structure affects weight transfer through the structure and how weight placement impacts the ability to hold weight without collapsing. Evaluate safety issues involved with materials being used in construction of the structure, particularly relating to structural collapse.	Use technology tools to enhance learning, increase productivity, and promote creativity. Use productivity tools to collaborate in constructing technology-enhanced models and produce other creative works. Utilize technology in research and design in all aspects of the solution including the structure, the marble placement, and the device used to remove parts of the structure to "lose your marbles." Employ technology in the development of strategies for solving problems in the real world. Understand and use technology systems.	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. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team. Apply contemporary engineering tools and technology to define, analyze, model, and build prototypes of the structure and the device used to remove sections of the structure to release the marbles. Evaluate structural characteristics of balsa wood and glued connections. Evaluate connections – surface area of joining pieces, geometry of joints.	Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation a balsa wood structure and a team created device. Utilize geometry and trigonometry to analyze the structure as a whole, including the team created device and removable sections that contain, and then discharge the marbles. 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 elements such as weight held, number of marbles "lost," creativity of the performance and the team created device, etc.

Odyssey of the Mind and Educational Initiatives

PROBLEM 5 (PERFORMANCE)
Silent Movie

Lights, camera...action! In this problem teams will create and present a performance depicting a Director character that produces and presents a silent movie featuring a humorous villain character that commits three silly acts of "villainy." Characters that are in the movie may not speak as part of the presentation of the movie. Instead, like classic silent films, the team will use music played on a team-created instrument and creatively displayed subtitles to convey its story to the audience and judges. Also, teams will use a signal to indicate when the movie begins and ends.

STEM Initiative

Science	Technology	Engineering	Mathematics
Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. Understand the properties of objects and materials, and the changes of properties in matter in order to create an instrument or other item capable of making sound. 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. Understand the abilities of technological design.	Use technology tools to enhance learning, increase productivity, and promote creativity. Use productivity tools to collaborate in constructing technology-enhanced models and produce other creative works. Employ technology in the development of strategies for solving problems in the real world, including those related to social situations. Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.	Design, test, and build a system, component, or process to meet desired needs within realistic constraints. Apply the engineering design process, troubleshooting, research and development, invention and innovation, and experimentation in problem solving and engineering design. Use engineering as a vehicle for creative and critical thinking and inquiry. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.	Make decisions about units and scales that are appropriate for problem situations involving measurement in order to design a moving set. 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 of the director character, the team-created instrument, the signal, effectiveness of the silent movie story line, etc.

Odyssey of the Mind and Educational Initiatives

PRIMARY PROBLEM
Wacky Weather Warning

Teams will create and present a humorous performance where a meteorologist makes three predictions of "wacky weather". The meteorologist will speak in rhymes and use a team-created forecasting device and a backdrop that serves as a weather map. The community will "tune in" to get the weather report in any creative way the team wishes.

STEM Initiative

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. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. Use and share observations of local weather conditions to describe patterns over time. Ask questions based on observations to find more information about the natural and/or designed world(s).	Use technology tools to enhance learning, increase productivity, and promote creativity. Use productivity tools to collaborate in constructing technology-enhanced models of various backdrops and produce other creative works. Employ technology in the development of strategies for solving problems in the real world. Understand and use technology systems.	Design, test, and build a system, component, or process to meet desired needs within realistic constraints. Apply the engineering design process, troubleshooting, research and development, invention and innovation, and experimentation in problem solving and engineering design. Use engineering as a vehicle for creative and critical thinking and inquiry. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.	Use visualization, spatial reasoning, and geometric modeling to solve problems in the creation of a backdrop. 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 artistic quality of the backdrop, creativity of the types of "wacky weather" forecasted, effectiveness of the meteorologist character, etc.

Odyssey of the Mind and Educational Initiatives

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. 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 (ex., use materials to build/design/change an item), to verbal problems (ex., name types of trees).

STEM Initiative

Science	Technology	Engineering	Mathematics
Use innovation to solve problems. Apply an intuitive understanding of gravity, motion, force and other physics concepts. Apply an understanding of the composition, properties, and creative use of materials. (ex., what can we use to support the structure, what can we use to make it taller, etc.) Test alternate hypotheses. (ex., what is another way to build this?) Evaluate results.	Utilize innovation in the creative use of everyday objects (ex., toothpicks, clay, paper plates) as tools and materials to solve problems. Implement nontraditional communication methods (gestures, tapping on table) to brainstorm and solve problems.	Apply knowledge of science, technology, engineering, and mathematics to define, analyze, 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. Develop an understanding that engineers need to communicate effectively as individuals and as members of a team.	Utilize estimation, measurement, computational skills, and spatial relationships in order to: a. Work within time and space limitations outlined in the problem. b. Analyze scoring criteria (what is worth the most points) to prioritize problem elements (what should we do first to get a higher score?)

Odyssey of the Mind and Educational Initiatives

COMMON CORE

Common Core is:

- Aligned with college and work expectations.
- Includes rigorous content and application of knowledge through higher-order skills.
- Built upon strengths and lessons of current state standards.
- Informed by top-performing countries, so that all students are prepared to succeed in our global economy.
- Evidence and/or research-based.

English/Language Arts	Odyssey Teams
Key Ideas and Details	All problems require team members to read closely to determine what the text says explicitly and to make logical inferences from it. Cite specific textual evidence when writing or speaking to support conclusions drawn from the text. Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
Craft and Structure	Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words. Analyze the structure of texts. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
Integrations of Knowledge and Ideas	Team members analyze how two or more texts address similar themes or topics in order to build knowledge. Delineate and evaluate the argument and specific claims in a text. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.
Range of Reading and Level of Text Complexity	Each problem requires students to read and comprehend complex literary and informational texts independently and proficiently in order to solve the problems.

Odyssey of the Mind and Educational Initiatives

Math	Odyssey Teams
Make sense of problems and persevere in solving them	Team members start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt.
Reason abstractly and quantitatively	Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; consider the unit/parts involved; attend to the meaning
Construct viable arguments and critique the reasoning of others	The student must understand and use stated assumptions, definitions, and previously established results in constructing arguments.
Model with mathematics	Utilizing problems arising in everyday life, society, and the workplace, students model mathematics in many phases of the problems.
Use appropriate tools strategically	These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations solving the problem they choose.
Attend to precision	Students, as team members, try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.

Odyssey of the Mind and Educational Initiatives

Math Cont'd	Odyssey Teams
Look for and make use of structure	Students look closely to discern a pattern or structure within a given problem. They also can step back for an overview and shift perspective. They can see complicated things as single objects or as being composed of several objects.
Look for and express regularity in repeated reasoning	Students notice if calculations are repeated, and look both for general methods and for shortcuts.

Writing Standards For Literacy in History/Social Studies, Science, and Technical Subjects	Odyssey Teams
Write arguments focused on a discipline-specific content	Many teams write a script to address the specifics of their solution.
Produce clear and coherent writing appropriate to task, purpose, and audience	Teams are encouraged to focus their script and their performance on a specific task, purpose, and audience.
Conduct short as well as sustained research projects to answer a question	Many aspects of Odyssey of the Mind require teams to conduct research to answer specific questions.
Gather relevant information from multiple sources	Odyssey teams gather material from multiple sources.

Odyssey of the Mind and Educational Initiatives

Reading Standards for Literacy in Science and Technical Subjects (RST)	Odyssey Teams
Follow precisely a multistep procedure when carrying out experiments or performing technical tasks	Teams follow many multistep procedures as they test and retest possible solutions.
Translate quantitative or technical information expressed in words in a text into a visual form	Odyssey teams take quantitative and technical information and transform it into a creative visual expression.
Compare and contrast findings presented, noting when findings support or contradict previous explanations	Students work as a team to compare and contrast findings as they develop their solutions.
Integrate and evaluate multiple sources of information presented in diverse formats and media	Students use multiple sources of information including a diversity of formats and media in their quest for solutions.
Evaluate the hypothesis, data, analysis, and conclusions found in science, verifying the data when possible and corroborating or challenging conclusions	Students naturally use the scientific method as they work through their long term solutions.
Synthesize information from a range of sources into a coherent understanding	The synthesis of information from a range of sources comes together in a coherent presentation of the team's solution.

Odyssey of the Mind and Educational Initiatives

Reading Standards for Literacy in History/Social Studies (RH)	Odyssey Teams
Determine the central ideas or information of a primary or secondary source	Team members work together to analyze both primary and secondary sources as they work with the problem and access resources as they search for a solution.
Determine the meaning of words and phrases as they are used in a text	The meaning of words and phrases in the Odyssey of the Mind problems has an impact on each solution.
Integrate visual information	Visual information can become an integral part of an Odyssey solution.
Distinguish among fact, opinion, and reasoned judgment	As teams search for a solution, the ability to distinguish between fact, opinion, and reasoned judgment can be critical.
Integrate and evaluate multiple sources of information presented in diverse formats and media in order to address a question or solve a problem	Teams integrate information from a wide variety of sources into their solutions.

Odyssey of the Mind and Educational Initiatives

Next Generation Science Standards May 2012 Draft Science and Engineering Practices	Odyssey Teams
Analyzing and Interpreting Data	Throughout the problem solving process teams continuously review, analyze, and interpret data as they develop their solutions building on past experiences and knowledge and seeking new information.
Asking Questions and Defining Problems	Questioning and defining problems is an integral part of the problem solving process.
Constructing Explanations and Defining Problems	Odyssey teams collaborate to define problems and construct and often reconstruct explanations supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.
Developing and Using Models	Students develop, design, and use models to predict, explain, or collect data to test ideas and develop solutions.
Engaging in Argument from Evidence	Using both oral and written arguments, teams use empirical evidence and data to design and support their solutions.
Obtaining, Evaluating, and Communicating Information	Odyssey teams generate, synthesis, communicate, and critique methods and designs as they seek solutions.
Planning and Carrying out Investigations	Students plan and carry out investigations that use multiple variables and provide evidence to support solutions.
Using Mathematics and Computational Thinking	Teams use mathematical and computational thinking to support solutions.

Odyssey of the Mind and Educational Initiatives

21st CENTURY SKILLS

21st Century Skills	Odyssey Teams
Global Awareness	Global competitiveness and understanding. Teams meet other teams from around the world at the annual World Finals.
Intellectual curiosity	Research to find information needed to solve the problem. Choosing a problem and idea that is personally exciting.
Interpersonal and Collaborative Skills Communication	Teamwork: consensus, collaboration, communication. Understanding and valuing the power of diversity within the team. Understanding personal strengths and weaknesses. Practicing active listening skills. Learning to value other team member's ideas and contributions.
Problem Solving & Creative and Critical Thinking	Analyze complex open-ended real world problems. Identifying challenges within the problem. Brainstorm possible technical solutions. Brainstorm possible thematic and artistic solutions. Evaluate potential solutions – How creative is this solution? Will other teams have thought of this? Spontaneous: training your mind to generate creative solutions by analyzing and evaluation your ideas and learning to use targeted thinking strategies.
Self-Direction	No outside assistance rule: teams generated research, solutions and decision making. Select potential solutions using scoring criteria. Planning for tournaments.
Authentic Assessment Accountability and Adaptability	Team reflection of effectiveness during spontaneous practice. Team reflection of tournament results. Planning and refining for future tournaments. Create-test-improve-retest best solutions.